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INNOVATION IN EDUCATION: NEW DIRECTIONS FOR THE AMERICAN SCHOOL. A STATEMENT ON NATIONAL POLICY.

Committee for Economic Development, New York, N.Y. Research and Policy Committee.

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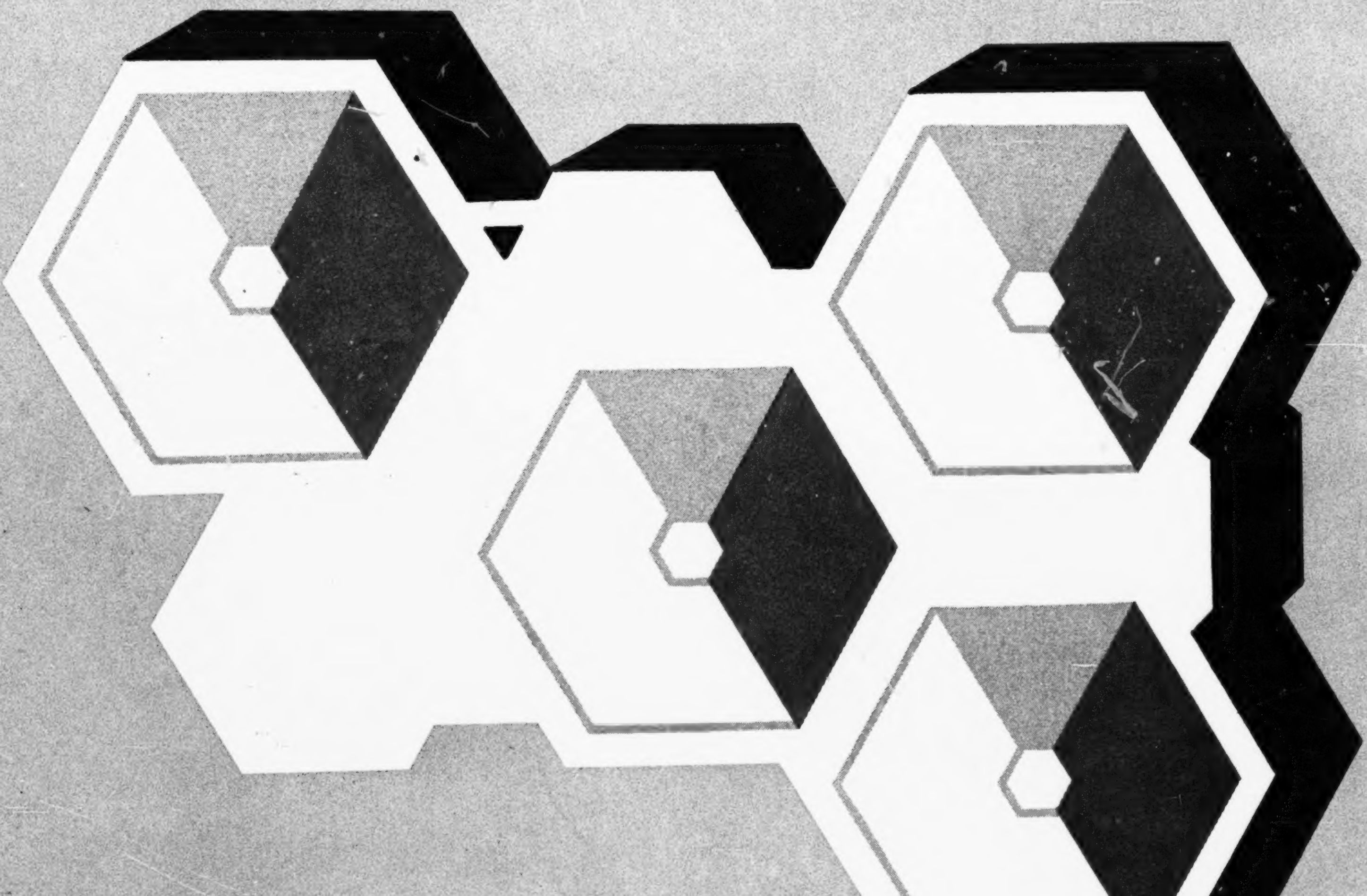
Identifiers-Commission on Research Innovation And Evaluation

The future of American schools depends in large part on their openness to innovations in instructional patterns, in school organization, in education for teachers and for deprived minorities, and in their use of educational technology. Basic and applied research are needed to determine useful innovation. Cost-benefit and cost-effectiveness analyses are needed to determine its practicality. The goals of instruction must be continually re-examined and revised in light of changing conditions and new possibilities. Educational equipment and new methods in themselves may influence these goals. To stimulate change a national Commission on Research, Innovation, and Evaluation in Education is recommended. Memoranda of comment, reservation, and dissent are appended. (MF)

Innovation in Education: New Directions for the American School



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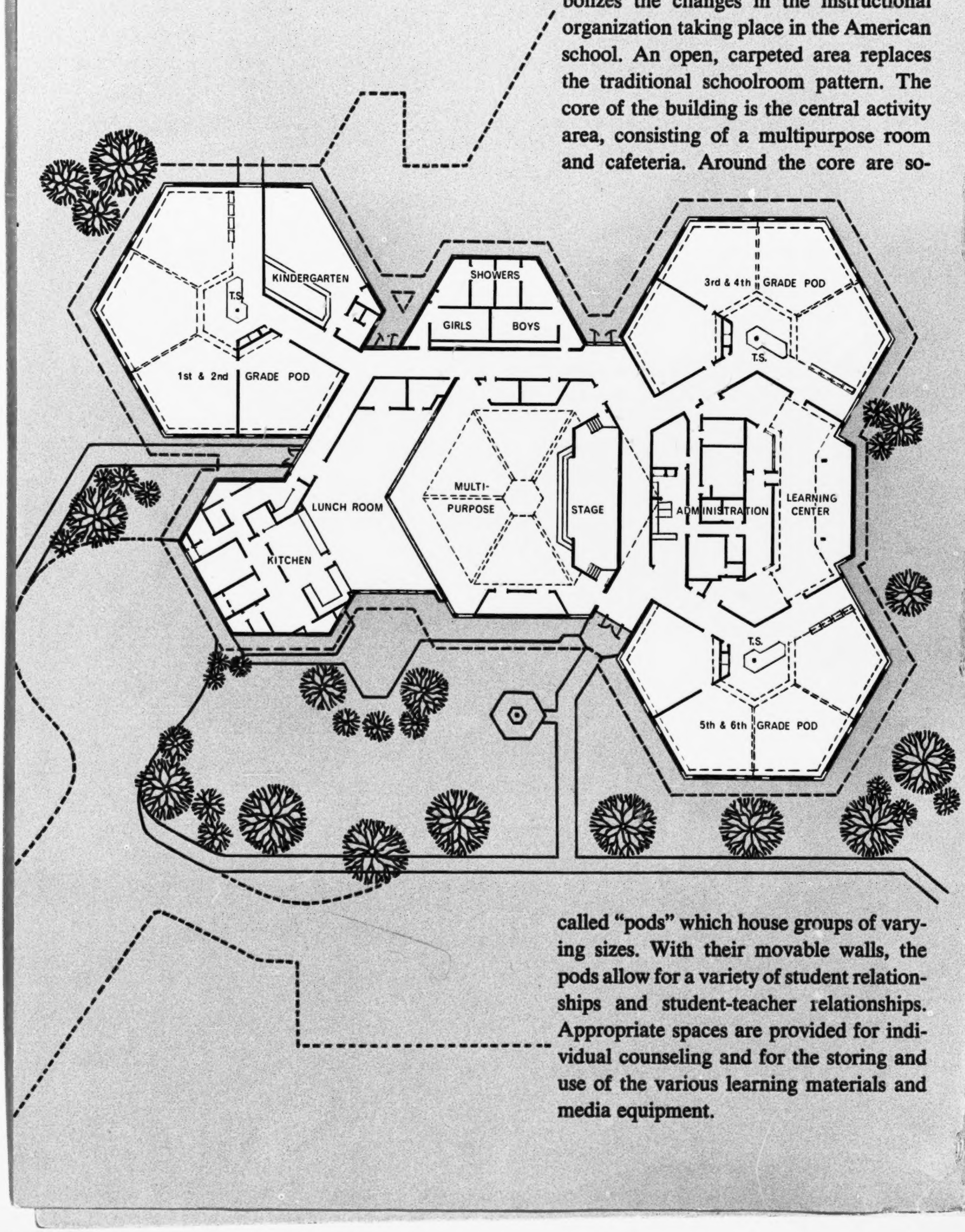
A STATEMENT BY THE RESEARCH AND POLICY COMMITTEE, JULY 1968

The roof of the elementary school depicted abstractly in the cover design of this statement has been lifted for this illustration to reveal a floor plan which symbolizes the changes in the instructional organization taking place in the American school. An open, carpeted area replaces the traditional schoolroom pattern. The core of the building is the central activity area, consisting of a multipurpose room and cafeteria. Around the core are so-called "pods" which house groups of varying sizes. With their movable walls, the pods allow for a variety of student relationships and student-teacher relationships. Appropriate spaces are provided for individual counseling and for the storing and use of the various learning materials and media equipment.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Innovation in Education:
New Directions for the American School

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by the Research and Policy Committee
of the Committee for Economic Development
July 1968

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THE RESPONSIBILITY FOR CED STATEMENTS ON NATIONAL POLICY

This statement has been approved for publication as a statement of the Research and Policy Committee by the members of that Committee and its drafting subcommittee, subject to individual dissents or reservations noted herein. The trustees who are responsible for this statement are listed on the opposite page. Company associations are included for identification only; the companies do not share in the responsibility borne by the individuals.

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The bylaws emphasize that:

"All research is to be thoroughly objective in character, and the approach in each instance is to be from the standpoint of the general welfare and not from that of any special political or economic group."

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Except for the members of the Research and Policy Committee and the responsible subcommittee, the recommendations presented herein are not necessarily endorsed by other Trustees or by the advisors, contributors, staff members, or others associated with CED.

The Research and Policy Committee offers these Statements on National Policy as an aid to clearer understanding of the steps to be taken in achieving sustained growth of the American economy. The Committee is not attempting to pass on any pending specific legislative proposals; its purpose is to urge careful consideration of the objectives set forth in the statement and of the best means of accomplishing those objectives.

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1. Voted to approve the policy statement but submitted memoranda of comment, reservation or dissent, or wished to be associated with memoranda of others. See pages 72—74.
2. Did not participate in the voting on this statement because of absence from the country.

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FOREWORD

Education in the United States is a vast and vitally important social enterprise. Today it embraces formal education at the primary, secondary, and higher educational levels, and also pre-schooling along with vocational and continuing education. We concentrate in this statement on schooling through the twelfth grade not only because this segment of formal education is the largest but because, in the eyes of CED's Research and Policy Committee, it presents the greatest challenge to the nation.

In 1959, in *Paying for Better Public Schools,* the Committee went a long way to foreshadow the subject of the present statement when it used these words:

> "A more receptive attitude toward new ideas must be cultivated in school administrators—at the state as well as the local levels—in the schools of education, and among parents. *Methods of determining what is useful and accelerating the adoption of proven ideas may well be the greatest need of all in our educational system.*"

In subsequent years, CED has examined other aspects of education. In *Economic Literacy for Americans* in 1962, we suggested ways in which the teaching of economics in our schools could be improved; in *Educating Tomorrow's Managers* in 1964, we examined the relationship between the business schools and the business community; and in *Raising Low Incomes Through Improved Education* in 1965, we described some of the improvements and extensions of education that would contribute to raising the productivity — and consequently the incomes — of many Americans with below-average incomes, especially the disadvantaged. At present CED subcommittees are concerned with other aspects of education such as the relationship of inadequate schooling and training to excessive unemployment and underemployment.

In preparing the present statement, the Subcommittee on Efficiency and Innovation in Education has relied heavily on fifteen papers contributed by outstanding scholars in the field of education. These papers cover topics ranging from the teacher's relationships with the new educational technology to intergovernmental cooperation in public schooling, and most of them will be published in the fall of 1968 as CED Supplementary Papers. The titles of these papers and their authors, several of them subcommittee advisors, are listed in the Appendix.

The subcommittee responsible for preparing this statement worked long and hard under the Chairmanship of John L. Burns. The members of the subcommittee, and its advisors, are listed on pages 5-6. Background research and drafting was done mainly by Sterling M. McMurrin, Dean of the Graduate School of the University of Utah and former United States Commissioner of Education, with editorial assistance from Carl Rieser of the CED staff, and with special assistance from T. H. Bell, State Superintendent of Public Instruction in Utah. On behalf of the Research and Policy Committee, I express our gratitude to the subcommittee, its advisors, the authors of the research papers, and to the participating staff.

Emilio G. Collado, *Chairman*
Research and Policy Committee

1: INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

We address this statement to all who in any way determine the course of public and private schooling. The task of improving education is the business of everyone — everyone who is concerned about the future.

The well-being of individual citizens, the integrity of the nation's social institutions, the strength of the economy, and the long-term national security depend on the effectiveness of the schools. Unless schooling keeps pace with the large demands that will be made on it in the years ahead, the American people will not achieve their personal, community, and national goals. A free society must always depend on the capacity of its schools to provide the kind of education that produces rational, responsible, and effective citizens.

In recent years, large and important gains have been achieved in raising the level of education for teachers, in strengthening and updating curricula, in improving textbooks and examinations, and in designing better school architecture and educational equipment. Moreover, the whole educational enterprise receives more adequate financial support from the public.

Yet even with these important gains, countless schools could be much more effective in meeting the demands made upon them. School districts as well as schools are often handicapped by outmoded organization. All too many schools are overcrowded and understaffed, and their pupils receive little personal attention. Instruction designed for the individual is rare even for the handicapped or the gifted. Most of the schools are still furnished with few if any modern teaching aids, and where these exist they are often little used. Many teachers are unprepared to employ the new curriculum materials and are unacquainted with new and improved teaching methods.

These conditions exist on a vast scale and deprive millions of children of opportunities that should be open to them. As a result our citizens suffer immeasurable losses in cultural and social attainment, in human dignity, and in economic productivity. To these losses must be added that part of the nation's welfare costs and the cost of delinquency and crime resulting from school failure.

The American people expect much from their schools, and we share these aspirations. It is the task of the schools to prepare our children and youth to live intelligently and productively in modern industrialized society. We concur wholeheartedly with the view expressed by the President's Commission on National Goals in 1960 that "the development of the individual and the nation demand that education at every level and in every discipline be strengthened and its effectiveness enhanced."[1/]

The schools are expected to discover and cultivate the talents and capabilities of the child and to assist in his growth to a mature, creative, and productive adult. This means that schooling must play a large role in the development of the child's basic physical and mental skills and in the cultivation of his intellectual powers and moral, artistic, and spiritual sensibilities. To achieve these ends, there must be sufficient diversity in the curriculum and variety of schools to accommodate the manpower needs of society and the varying vocational and intellectual interests of youth.

In pursuing the goals which have been set for the schools, complete success cannot be expected. In this matter hopes and ideals far outrun the practical possibilities. But ways must be found for moving steadily ahead. Where so much that is of fundamental importance is at stake, a people with advanced theoretical knowledge, practical know-how, and economic affluence cannot tolerate anything less than the best of which they are capable.

1/President's Commission on National Goals, *Goals for Americans: Programs for Action in the Sixties* (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1960), page 6.

An increasing over-all expenditure on schooling in the United States in coming years can be anticipated. Yet it is vitally important to recognize that the expenditure of increased funds will not by itself guarantee improved education. It has become increasingly apparent that additional funds are often employed to perpetuate and extend inefficient operational techniques and ineffective instructional methods. The nation cannot afford to waste its resources by investing them in schools that fail to achieve the level of operational efficiency and effectiveness in instruction which is now within their reach.

The Precondition for Better Schooling

This statement concentrates on instruction in elementary and secondary schools. We focus on problems of instruction for three reasons:

1. We are convinced that a most pervasive problem in American schooling is the need for improving instructional techniques and processes. In any national effort to improve our schools the decision-makers at all levels of education, and the public as well, must give immediate attention to the principles and methods of teaching and learning.

2. Such improvement is the precondition for achieving better education for all—for those from poor families as well as those from affluent families, for the culturally deprived as well as the advantaged.

3. In previous statements this Committee has addressed itself to other vital problems affecting American education. We have taken a position on improving school financing and on the contribution that education can make in raising the income level of the poor.[1] In studies presently underway we are concerned specifically with the problem of education and training for the underprivileged, particularly for the non-white "underclass."

The present statement does not attempt to identify all the problems faced by the schools, much less to prescribe for their solution. We recognize that the most serious failures of American education are produced by the large failures of our society. These failures are found especially in schools whose children live in poverty and cultural deprivation and which, more often than not, are segregated by color and race. Segregation can and often does have disastrous effects on the quality and effectiveness of education, yet it is still a common plight of schools in the North as well as the South.

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[1] Statements on National Policy, by the Research and Policy Committee of the Committee for Economic Development, concerned with these subjects are *Paying for Better Public Schools,* December 1959, and *Raising Low Incomes Through Improved Education,* September 1965.

The schools themselves cannot completely control the conditions which produce segregation, conditions which involve especially employment and housing. These can be changed only by imaginative, forceful, and cooperative effort on a national scale, involving both private and government action.

The schooling of deprived minorities in the slums and ghettos and in many poor rural areas has been a tragic failure and one that will not be corrected without a major revolution in the objectives, methods, and organization of the schools. It will not be corrected until the deprivation of the preschool years is overcome and the child of the slum or ghetto has the capability of gaining basic literacy, nor until the schools are capable of effectively preparing young people for the jobs which industry and business can provide for them.

A child may have great difficulty in learning to read or to employ effectively elementary language or to distinguish simple relationships if he has never heard a story read aloud, has never observed an adult reading a magazine or book, or has never learned to name the basic colors. The child who comes to school in the morning without breakfast and stays without lunch will not be an eager learner. It is a shocking fact that in many school systems where school lunches are most needed there is no provision for them and little or no official interest in providing them. The child who is mentally or physically ill and without medical care may make little progress in school despite the efforts of even the best teachers.

To achieve adequate schooling for the masses of disadvantaged will require immediate and increasing concentration of the nation's educational resources on preschooling and compensatory education. In another study going forward, the Committee is addressing itself to the role of education in breaking the poverty cycle and improving the quality of urban life. This most important and urgent problem is too large to examine adequately in the context of this statement on instruction. Our findings and recommendations on improving effectiveness in instruction, however, are all relevant to improving schooling for the disadvantaged.

It is the view of this Committee that, within the range of available resources, the nation should equip its schools to open the doors of the future to every person—to the economically depressed, the deprived, and the culturally, mentally, and physically handicapped, as well as to the advantaged and the especially gifted. More effective methods of teaching, more exciting ways of capturing children's imagination, more attention to the individual's needs and capacities—these are an even greater need in ghetto schools than in other schools. A national effort to improve the instructional processes will benefit all.

Four Imperatives for the Schools

Our studies convince us that research and technical invention are opening up new and vitally important possibilities in instructional processes at the very time when more effective methods are desperately needed to help overcome the failures in education. If these techniques are to be applied successfully to the problems confronting the schools, it is clear that there must be a basic change in the attitudes and approaches of large numbers in the teaching profession toward instructional organization, methods, and research. On the basis of our investigations, we conclude that there are four imperatives today:

1. The American school must be better organized for innovation and change.

2. There must be an increasing emphasis on both basic and applied educational research and on the dissemination and practical application of that research. The useful and effective must be distinguished from the nonproductive and wasteful through developmental studies employing research findings.

3. School systems must employ continuously the results of cost-benefit and cost-effectiveness analyses in order to allocate effectively the resources available to education and to distinguish among programs of high and low priority.[1]

4. There should be established a national Commission on Research, Innovation, and Evaluation in Education to encourage intensified and widespread research, development, and evaluation bearing on all aspects of education as a means to more effective methods of instruction.

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[1] "Cost-benefit analyses provide the means for comparing the resources (costs) to be employed on a specific project with the results (dollar benefits) *likely* to be obtained from it. Cost-effectiveness analyses, on the other hand, are designed to measure the extent to which resources allocated to a specific objective under each of several alternatives *actually* contribute to accomplishing that objective, so that different ways of gaining the objective may be compared." From *Budgeting for National Objectives,* a Statement on National Policy by the Research and Policy Committee of the Committee for Economic Development, January 1966, pages 37-38.

In the remainder of this introduction we summarize the basis for these conclusions and present our major recommendations.

1. *Organizing for Change*

The future of the schools depends in large part on whether they can overcome in educational policy and practice what is frequently an extreme conservatism and a strong resistance to change. This depends in turn on whether they can develop a genuine openness to experiment and innovation. This is difficult because the conservatism of the schools has been a natural response to society's expectation that they reflect dominant social opinion and that they perform an essentially conservative function.*

The experimental activities of the schools must be designed to protect children and youth from the negative effects of experimental failure, but success will come only if the schools encourage new and revolutionary ideas and are willing to question even the best-established educational traditions. It is evident that the major deficiencies of the American schools cannot be remedied simply by refining the customary organization and procedures of classroom instruction or by extending the work of the conventional schools.

We are convinced that reconstruction of instructional staffs, instructional patterns, and school organization must lie at the heart of any meaningful effort to improve the quality of schooling in this country.

The introduction of team teaching, differentiated teaching functions, and more flexible salary scales offers great opportunity to achieve better results at lower cost. Even more important is the reorganization of staffs and personnel functions so that the new advances in teaching techniques and technology can be utilized effectively. Indeed, considerable money and effort have already been wasted by the premature introduction of such innovations without first creating the conditions for integrating them effectively into school programs.

The new educational technology, especially instructional television and various types of audiovisual equipment, holds considerable promise for improving the quality of instruction. No opportunities to advance education through new technology should be overlooked. However, our interest in instructional technology increases rather than lessens our concern for improving teacher education and developing better curriculum materials. For however sophisticated and useful the machine may become, it will always be an instrument employed by human educators.

---

*See Memorandum by MR. MARVIN BOWER, page *72*.

We see no conflict between teachers and machines, but rather the opportunity for teachers to become more effective through the use of machines. The substance and quality of education must always depend on the knowledge, wisdom, and ingenuity of scholars, the designers of curricula, and, most important, teachers who work directly with children and teenage students.

We therefore call attention in this statement to several other factors of major importance, above all the necessity for improved education for teachers and for continued intensive work on improving curriculum materials. If the schools of tomorrow are to make better use of instructional personnel than is common today, teacher education must be fashioned on the findings of continuing studies of educational goals and the means necessary to their achievement. The administrators and faculties of institutions engaged in the preparation of teachers should design their curricula to include adequate instruction in the values and use of both conventional and new educational media.

We are not proposing indiscriminate change. But we do insist that the cultivation of a social and educational climate that is congenial to change in the schools is long overdue. If the schools are to make real progress in instruction, most of them must be jolted from their complacency by vigorous thrusts that will break through the old patterns and support experiment and innovation. Sometimes such thrusts can come from within the school system via the work of teachers and administrators possessing strong innovative talents, but sometimes they must come from without. Because the system of incentives in education is weak, the reforms and innovations we advocate will not be brought into being without great difficulty. Change in school practices and organization can be both difficult and painful; sometimes it is advisable to change even when it hurts.

Some practices and forms of organization that appear to be effective must be replaced by others that will be truly effective. The proposals that follow are offered with this end in view.

We believe that early schooling is probably desirable for all children and that it is a necessity for the children of culturally disadvantaged areas. We therefore recommend extensive experimental activity in preschooling, not only in the substance and processes of instruction but also in organization, administration, and finance. We urge the establishment of both public and private nursery schools, especially in the neighbor-

hoods of the disadvantaged. There is room for much development in this direction by those industrial and business firms which employ large numbers of women, particularly by those firms that are establishing facilities in the ghetto areas.

Recognizing the improvement in the quality of instruction that already has resulted from the curriculum study projects of recent years, we recommend the continued funding of such projects by both public and private agencies. These studies should be extended to cover the entire spectrum of the school curriculum. The joint efforts of subject-matter scholars, education experts, and technicians are essential to the effective upgrading and updating of instructional materials and methods in all fields. Publishers and other producers of instructional materials and manufacturers of educational equipment should assume a larger responsibility in this enterprise.

We recommend continued and more extensive experimentation in school organization to eliminate the regimentation of students that results from the conventional class units and lock-step method of advancement. We believe that the combination of differentiated staffs, team teaching, and variable student grouping, together with the use of instructional television and other audiovisual media, has much promise for individualizing instruction.

We urge school boards, school administrators, and professional teachers' organizations to undertake a reconstruction of the basis for teacher compensation to bring pay scales more in conformity with the functions, responsibilities, and performance of teachers. Such pay scales should also take into account the shortages in certain teaching skills.

2. *Stimulating Research and Innovation*

Some segments of American society are advancing at impressive rates. Much of this advance is the result of research and bold experiment that generate new ideas and encourage innovation in organization, management, production, and distribution. Progress often depends on overcoming opposition to change and creating an environment in which new ideas, attitudes, and ways of doing things can emerge and develop. This is true of the schools as it is of business and industry.

The expansion of research in education, though requiring a relatively high expenditure, will eventually yield, as it has in industry, a pay-out in terms of efficiency and productivity. We urge the development of a national system for the conduct of educational research and the dissemination of research findings to ensure their application in experimental and demonstration activities designed to test their practical value and publicize their worth. Every school system should be tied directly or indirectly into a research and developmental program to keep it abreast of new knowledge and techniques.

Innovation in education, whether it involves the use of new curriculum materials or new educational technology, has become essential if the schools are to be genuinely effective in achieving their aims and goals. Continuing assessment of the product of the schools also is necessary. This means the development of principles and techniques for critically judging the worth of whatever the schools teach and the effectiveness and efficiency of their methods of instruction. To attain these goals, we suggest the establishment of prototype model systems that can exhibit new learning materials and new methods and techniques of learning to both the profession and the public. There also is need for more effective techniques for the practical implementation and dissemination of useful findings throughout the nation's school systems.*

We wish to stress the great need for extensive research, experiment, development, and evaluation in educational technology. This requires well-financed and expertly staffed centers that have effective working relations with experimental schools and with teacher education institutions. We urge the establishment of such centers. We believe that private nonprofit agencies and producers of educational equipment and materials can contribute importantly to this work.

We urge the institutions engaged in the preparation of teachers to design their curricula to include adequate instruction in the values of research and the uses of advanced educational media. Institute programs to upgrade and update teacher competence have already proved their value. These programs, made available at leading universities to practicing elementary and secondary teachers, should be designed to improve both subject matter competence and capability in utilizing advanced teaching technology.

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*See Memorandum by MR. S. CLARK BEISE, page 72.

3. *Applying Cost-Benefit Analysis*

Throughout our studies and deliberations we have been principally concerned with both the quality of instruction and effectiveness and efficiency in the educational process. By *effectiveness* we refer to the degree to which the aims and goals of the schools are achieved. By *efficiency* we refer to the relation between the educational product—the educated person and the educated society—and the input into the schools in the form of human talent, energy, time, and material resources.

Individualized instruction, geared to the individual's interests, abilities, and learning rate, is one of the cherished goals of American education. It is an aspiration which we wholeheartedly share. Yet the schools are making very slow headway in this direction through present means, principally through efforts to reduce the pupil-teacher ratio. Over the past decade, while the nation has increased its annual expenditures for its public schooling from about 3 per cent to nearly 4 per cent of the gross national product, there has been a reduction of only three pupils in the average class size of elementary schools. To achieve any fundamental reduction in average class size, while maintaining the traditional instructional practices, would in our view put a serious drain on the trained manpower of the country and raise the costs of staffing the schools to unacceptable levels.

More important, we question whether the pupil-teacher ratio provides an adequate basis for determining educational policy. We believe that the key to achieving effectiveness in education lies in increasing the productivity of the individual teacher, and that the means are now available through the various techniques that we have suggested; e.g., the reorganization of instruction, the redesign of curricula, improved and new audiovisual methods, and the improvement of teacher education.

What will these and other innovations cost in relation to the benefits they secure? Fortunately, new ways of measuring, testing, and assessing effectiveness and efficiency in education are being developed. Techniques of cost-effectiveness analysis and systems analysis, when used in the broadest sense, can now be employed in assessing the efficiency of school management. Moreover, research in the methods of measuring intellectual growth and attitudinal changes promises to increase the capability to evaluate a school's educational effectiveness. Although there are numerous imponderables in education that cannot be quantified or measured, we believe that these techniques will assist the schools in setting priorities and designing programs.

It is now possible for the schools to take advantage of these new opportunities. The pressure of enrollments nationally is declining and the general supply of teachers is increasing at the same time that analytical techniques for better allocation of school resources are becoming available. Now that they are released from the struggle to absorb large numbers of additional students, many schools have the opportunity to make serious efforts to decide among programs of high and low priority.

Even more fortunate is the availability of new educational resources which can help the schools move to new heights of performance when the proper conditions for their use are established. From our own study of the costs of these resources, we believe that the use of instructional television and various audiovisual equipment will find a continuous and growing acceptance in the schools, while computer assisted instructional systems may not achieve large-scale use for some time because of the great cost involved.

> **We urge immediate exploration by school administrators of the application of program accounting techniques in order to identify costs in school systems and to take advantage of cost comparisons. The adoption of such techniques by school districts will be advanced greatly if assistance and leadership in this area are provided by state departments of education and by university schools of business, economics, and education. In applying cost-effectiveness analysis over the whole range of school investments and costs, we urge school districts to explore thoroughly the possible benefits that will result if the use of school facilities is extended by various means to include periods during which they are now unused.**

> **We strongly recommend that broad-based studies be made of the costs and benefits that can be expected if the various technologies involving audiovisual equipment, television, computers, and other devices are applied to instruction in the schools on a wide scale. Such studies should take into account the benefits that may be obtained through increasing the effectiveness of the learning process at the same time that they weigh the effects of the new resources in terms of the organization of instruction, teacher pay schedules, productivity, probable use by teachers, and other vital matters.**

4. *Establishing a National Commission*

There is a need for a national Commission on Research, Innovation, and Evaluation in Education to provide the structure for nongovernmental leadership in meeting the need for greatly intensified and expanded research and developmental work bearing on all aspects of schooling, to stimulate widespread efforts to introduce new curricula and more effective methods of instruction in the schools, and to encourage careful evaluation of innovations and their influence on the effectiveness of education. Such a commission, which is described more fully in the final section of this statement, would be effective in stimulating and coordinating research at all levels of education. It would provide avenues for the dissemination and application of research findings, and establish programs for the evaluation of curricula and instructional methods.

> **We propose the creation of a Commission on Research, Innovation, and Evaluation in Education,* established under charter by Congress as an independent, nongovernmental agency, empowered to receive both public and private funds. The membership of the Commission should be broadly representative of the major segments of our society and should comprise persons of unquestioned stature as educational statesmen. While each of the Commission's three basic functions should be performed independently of the others, achievement of the common purpose–improvement in education–calls for these efforts to be coordinated, especially in matters of priority.**

In its *research* function the Commission should encourage both basic and applied research in all branches of education. In its *innovative* function it should stimulate developmental activities which will enable the effective employment of useful research findings and should disseminate the results in forms available for school use. In its *evaluation* function it should authorize and fund large-scale evaluations of the product of the schools and the effectiveness of innovation in improving results. The Commission should be concerned not only with the basic learning skills and the acquisition of knowledge but also with the effectiveness of the schools in achieving the entire spectrum of educational purposes and goals.

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*See Memorandum by MR. ELVIS J. STAHR, page 73.

2: PROBLEMS OF THE AMERICAN SCHOOLS

The purpose of this statement is to suggest ways by which the nation can secure greater return from its investment in elementary and secondary schooling. For some years, the costs of schooling, reflecting increasing demands on the schools, have been growing much faster than the growth of the economy. This process is likely to continue. Expenditures on education can be expected to increase considerably as a result of the extension of the age level of schooling downward into the preschool years, the expected increase in the retention rate of the secondary schools, the growth of compensatory as well as vocational and technical education, and the demands for a higher quality of instruction.

What is in doubt is whether additional appropriations to the schools will be spent effectively in raising educational productivity. If past trends continue and increased money is expended on the present conventional format of education, there is little assurance that significant gains will be made.

However, we believe that if our recommendations are followed, the return on the investment in education will rise while at the same time its reach will be widened and its quality improved. We are concerned not only with costs of education but also with its *benefits,* both pecuniary and nonpecuniary. These benefits can be increased through greater productivity in the instructional process and through a far greater emphasis on research in education.

1. THE INVESTMENT IN SCHOOLING

The benefits of education can be demonstrated in several ways. First, in a free society education helps to develop greater awareness of, and ability to participate effectively in, the democratic process. There is a striking correlation between people's educational attainments and their participation in activities that help make a democracy strong.[1/]

Second, there are substantial economic and social benefits from education. Benefits accrue to employers in terms of a literate and trained work force. More broadly, education is one of the chief factors contributing to economic growth. From 1929 to 1957, it is estimated that 21 per cent of the growth of real national income per person employed was attributable to the greater education of the labor force, while another 36 per cent was attributable to the "advance of knowledge."[2/]

Finally, there are sizable private returns to those persons who have had the advantage of schooling and whose well-being and personal goals and ambitions are thereby advanced. Aside from the intangible benefits involved, the direct material benefits resulting from additional schooling have been demonstrated by various studies. These show a correlation between the quantity of education a person has received, his earning power, and his prospects for employment, even allowing for differences in cultural and family background, native ability, and motivation.[3/]

Our special concern is with the opportunities foregone as a consequence of deficiencies in the schooling of the underprivileged. Not only have there been losses in terms of blighted lives and human misery, but society as a whole has paid a high price for its neglect and failure

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1/V. O. Key, Jr., *Public Opinion and American Democracy* (New York: Knopf, 1961); Angus Campbell, Gerald Gurin, and Warren Miller, *The Voter Decides* (White Plains: Row, Peterson, 1954).

2/Edward F. Denison, *The Sources of Economic Growth in the United States, and the Alternatives Before Us,* Supplementary Paper No. 13, Committee for Economic Development, New York, January 1962.

3/In 1963, the Department of Labor reported that youths who had completed high school were earning an average of $61.09 a week, while dropouts were averaging $50.84. In 1965, the graduates had advanced to $98.54 a week, a rise of $37.45, while the dropouts averaged $61.88, a rise of only $11.04.

to do what could have been done. As if the waste in sheer human terms in itself were not enough, the inadequacies of the schools have been in part responsible for placing a heavy burden on the local, state, and federal governments in the form of welfare, correctional, and similar costs. It is far preferable to spend public money in an effort to produce the positive results that may occur through schooling rather than to assume burdensome and unproductive expenditures as a penalty for inadequate education.

To make real headway in the attempt to provide adequate schooling for the disadvantaged, the nation must be willing to invest heavily in compensatory education that will help to make up for barren preschool years. An extra measure of teacher talent, time, and energy will be required to teach effectively those who often lack the motivation for schooling or the environment essential to success in school. This will mean providing teachers who possess special qualifications for instructing and counseling the disadvantaged. It will mean increased appropriations for equipment, for the funding of special instructional programs and projects, and for the rehabilitation of school facilities and the construction of new schools. As previously noted, this Committee is examining these and other aspects of education for the disadvantaged in another study now going forward.

The nation also faces many other demands on its schools over the coming years. A brief review follows of the pressures that have been placed on the schools over the past few years and of the pressures that can be anticipated for the future.

Growth of Expenditures for Education

Expenditures on elementary and secondary education account for two-thirds of total direct outlays on all formal education in the United States. In the school year 1966-67 these total outlays were nearly $49 billion. (Table 1, page 24) The outlays on elementary and secondary education were about $32 billion, of which nearly 90 per cent was accounted for by the public schools.

The sums devoted to public school education comprise a growing component of gross national product (GNP). Thirty years ago they were 2.4 per cent, and after a dip relative to GNP during and just after the war, they rose to 3.1 per cent in 1956-57 and 3.8 per cent in 1966-67.

Table 1.

ESTIMATED EXPENDITURES on FORMAL EDUCATION, PUBLIC and PRIVATE: 1966-67

(billions of dollars)

ALL LEVELS OF EDUCATION	**$48.8**
ELEMENTARY AND SECONDARY EDUCATION	32.2
Public	28.5
Current expenditures and interest	*24.4*
Capital outlay	*4.1*
Nonpublic	3.7
Current expenditures and interest	*3.2*
Capital outlay	*0.5*
HIGHER EDUCATION	16.6
Public	9.7
Nonpublic	6.9

Source: U.S. Department of Health, Education, and Welfare, Office of Education, *Digest of Educational Statistics, 1967* (Washington, D.C.: U.S. Government Printing Office, 1967), page 16.

Of the various factors behind the growth of school expenditures, two in particular have been influential: (1) the rapid increase in enrollment, due mainly to the rapid population increase and also in some degree to the higher retention rate; (2) cost increases, influenced primarily by rapidly rising salaries.

Population increases: The postwar boom in births forced an enormous expansion of schools and put great pressures on the entire American educational system throughout the 1950's and into the 1960's. During the decade from 1955 to 1965, the public elementary and secondary schools of the nation had to cope with a 37 per cent increase in enrollment. (Table 2, page 26) The sheer increase in numbers placed such heavy demands on school resources, human as well as physical, that concentration on the improvement of quality in the schools was difficult and at times very nearly impossible.

Cost increases: The cost of goods and services used for public schooling are estimated by the Bureau of Labor Statistics to have increased 48 per cent over the same time period. Since the overwhelming proportion of public expenditures for schools is required to pay for the services of teachers, this aggregate rise in costs was due in large part to the rise in teachers' salaries, reflecting both the increase in prices in the economy as a whole and the shortage of teachers. Average salaries for the instructional staffs of public schools advanced 61.6 per cent during the years from 1957 to 1968, with annual increases ranging from 3.6 per cent in 1965 to 6.6 per cent in the current school year.

In sharp contrast with the salary cost for school instruction, which exceeds 60 per cent of current expenditures, the money spent on instructional materials, equipment, and supplies is extremely small. It is estimated that in 1966 approximately $840 million—only 3.3 per cent of current expenditures for public schooling—was spent on these materials and equipment, not including audiovisual equipment or teaching systems.[1] More than half the $840 million was represented by textbooks. However, there was considerable expansion in the use of newly-designed audiovisual and other equipment and other materials, even though the total volume of such purchases is relatively small.

The heavy drag of population and price increases on schooling can be seen clearly when the performance of public elementary and secondary education is compared with that of other public services over recent years.[2] The money expended on public schooling produced less in the way of improvements in the scope and the quality of services than was true of other public services generally. This improvement has been estimated at only 8 per cent for public schooling over the 1955-65 decade as compared with an estimated improvement of 32 per cent for all other public services as a whole.[3]

1/Midwest Research Institute, *Educational Technology,* Kansas City, Mo., April 1967.

2/Over the 1955-65 decade, while school enrollment increased 37 per cent, as already noted, price increases for goods and services purchased by the schools amounted to 48 per cent. This compares with increases of 22 per cent in the population served and 35 per cent in the prices paid by all other public services, including health and hospitals, public welfare, highways, and urban services.

3/Lawrence R. Kegan and George P. Roniger, "The Outlook for State and Local Finance," *Fiscal Issues in the Future of Federalism,* CED Supplementary Paper No. 23, Committee for Economic Development, New York, 1968.

Table 2.

ESTIMATED ENROLLMENT IN PUBLIC AND PRIVATE EDUCATIONAL INSTITUTIONS: 1955-75 *(millions)*

	Actual			*Projected*	
	1955	1960	1965	1970	1975
ELEMENTARY AND SECONDARY SCHOOLS					
Public	30.7	36.3	42.2	45.6	45.7
Private	4.6	5.9	6.6	6.5	6.4
INSTITUTIONS OF HIGHER EDUCATION (Degree Credit)					
Public	1.5	2.1	3.6	5.0	6.5
Private	1.2	1.5	1.9	2.3	2.6

Sources: U.S. Department of Health, Education, and Welfare, Office of Education, *Projections of Educational Statistics to 1976-77*, 1967 Edition (Washington, D.C.: U.S. Government Printing Office, March 1968), page 8, except for 1955 data which are from U.S. Department of Health, Education, and Welfare, Office of Education, *Projections of Educational Statistics to 1975-76*, 1966 Edition (Washington, D.C.: U.S. Government Printing Office, 1967), pages 5 and 6.

The Years Ahead

The great pressure on American elementary and secondary schools imposed by the postwar boom in births has subsided. The population wave has largely worked its way through the elementary and secondary schools and is moving through the colleges and universities. During the 1965-75 decade the public schools will probably have to accommodate an increase of only some 8 per cent in enrollment—

about 3.5 million students—as against more than 37 per cent (11.5 million) over the 1955-65 decade. (Table 2)

As a result there will be some slackening of the pressure on school expenditures in terms of capital required for new school construction and salaries for additional school teachers to handle the increased enrollment resulting from population increases. The Office of Education projects a 37 per cent increase in public school expenditures in the decade between 1965-66 and 1975-76.[1] This would mean that public school expenditures would rise from $28.5 billion in 1966-67 to about $39 billion in 1975-76 (in constant 1965-66 dollars).

This projection may seriously underestimate the rise in expenditures. The slowing down in the rate of increase in over-all enrollment will coincide with rising pressures on the schools not only to improve the quality of instruction but also to assume new and urgent social responsibilities. The need for many schools to expand or improve their physical facilities, or enlarge their instructional staffs, has by no means disappeared. The continuing shifts of population into urban and suburban areas place large demands on facilities, equipment, and teaching staffs. School facilities in many parts of the nation today, particularly in the slums, are often grossly inadequate or obsolescent; there is great need for continued expansion and modernization. Many schools are still overcrowded, and their teaching staffs cannot handle the loads already imposed on them. Undoubtedly there will also be a considerable expansion of preschooling, particularly under the Head Start program; and, as public schooling moves down to the children three to five years old, new costs will be incurred.

Some of the pressures that now prevail will also continue in the coming years. The demand for teachers, though diminishing in terms of the teachers required for new students, will remain high because of the need (1) to replace the maturing population of teachers now in the schools, and (2) to fill new teaching positions opened up by preschooling, compensatory education, and greater individualization of instruction. While it is true that the entrants to the teaching profession will increase because of the increasing number of graduates from the colleges, on the other hand, the increasing militancy of government workers in general and of teachers in particular may result in the continuation of relatively large salary increases in public schooling.

1/U.S. Department of Health, Education, and Welfare, Office of Education, *Projections of Educational Statistics to 1975-76* (Washington, D.C.: U.S. Government Printing Office, 1966), pages 76, 80, and 82.

For the various reasons cited above, increasing expenditures on schooling can be anticipated. Our concern is with the way these increasing sums will be spent—whether they will be spent effectively in raising educational productivity and in raising the quality of instruction. If past trends continue, and the money is expended on the conventional format of education, we are concerned lest these sums be absorbed in large part in across-the-board raises to teachers under seniority-based salary schedules, and in small and indiscriminate—though costly—reductions in class size. Over the past decade, the size of classes in public elementary schools declined from 29 to 26 students. Projecting the historical trend suggests a class size of 24 students in 1975.[1] Assuming that students will benefit by such a reduction in class size, the gain in learning would be relatively slight while the cost of the salaries for the number of teachers required would be considerable. The question is therefore not whether students will benefit if class size is lowered but whether the benefits will be greater if the same amount of money is spent on an instructional staff that is better trained and provided with better techniques, assistance, and methods.

In our view, if the quality of schooling is to be raised at a cost that is acceptable in terms of present school expenditures, a breakthrough is required in instructional procedures and instructional organization of the nature described in this statement.

2. THE NEED FOR RESEARCH, DEVELOPMENT, AND INNOVATION

The progress of the schools over the last few years has clearly exhibited the worth of educational research and development. Much has been learned about relating subject matter to instructional goals, refining the techniques of explanation, cultivating the capacity for discovery, and defining other aspects of the learning process. But much more needs to be known if the schools are to continue to move ahead. Better techniques must be developed for disseminating such knowledge and applying it in actual instruction. Both basic and applied research are necessary if false starts, blind alleys, and wasted time are to be avoided.

Until recently there has been little recognition of the importance of educational research. Educators are now beginning to appreciate the need for reliable knowledge as a basis for educational planning. There is a growing awareness of the scarcity of knowledge relating to education. The total funds expended in the United States on educational research, development, and evaluation is a small fraction of 1 per cent of the total investment in education. The schools suffer severely because of this neglect. No major industry would expect to progress satisfactorily unless it invested many times that amount in research and development. For example, the expenditure of company funds on research and development by the electrical and communications equipment industry in 1966 totalled 3.4 per cent of net sales. Individual companies of course exceed this figure, as in the case of International Business Machines, which currently devotes some $300 million annually, or about 5 per cent of revenue, to research and development.*

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[1] *Ibid.*, pages 43 and 44.

But unless the findings of research are disseminated effectively in forms to be usefully employed, the investment is lost. Nowhere has the impact of research been more dramatic than in agriculture and medicine. In agriculture, the county agent with his demonstrations has been the link between the research laboratory and the farmer. In medicine, the teaching hospital, with the same persons functioning as research scientists and teaching physicians and surgeons, has brought the findings of science into the sickroom.

Education unfortunately has lacked the kind of thrust which agriculture has received from the activities of the county agent, and it does not have a counterpart to the teaching hospital. Here is an urgent national need. It is a need that teacher education institutions should satisfy. To function effectively in this way, most of them must greatly increase their involvement in research and their developmental work with the schools.

The findings of research must be brought into the schools—not just a few schools, but all schools. Too often those findings simply gather dust on the shelves of the research scholars. Within the schools themselves there are few people who are qualified to analyze research findings even if these were made readily available. Nor are there many people in the school system capable of aiding teachers and administrators in converting these findings to practical use. This implies the development of the capacity of teachers and administrators to judge the worth of new ideas and techniques. The elimination of useless ideas and practices is as important as the acceptance of good ones.

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*See Memorandum by MR. FRED J. BORCH, page 74.

The missing link in education is development research as it is practiced in industry. Of industry's total research and development funds, 4.2 per cent are expended on basic research, while applied research accounts for 18.8 per cent and development for 77 per cent. Though there is great need for more basic research in education, there is an immediate demand for more extensive developmental work which will evaluate and apply the findings of research and demonstrate their practical worth. At present only 10 to 12 per cent of the funds expended on educational research and development are devoted to development.

Another factor of crucial importance is the need for reliable assessments of the quality of instruction. This is a task of national proportions, and recognition of its complexity and importance is just beginning. Reliable evaluations of the product of the schools are necessary to effective planning for improving instruction.

The evaluation of instruction requires techniques for measuring individual potentials. A child's ability to read can be tested and intelligent judgments on his capacities for speaking and writing can be made. His ability to solve mathematical problems can be tested and in some degree his fund of scientific information can be measured. But it is quite another thing to raise questions about his power of imagination, his artistic sensitivities, or his capacity to make intelligent decisions. Much research is required in this area.

Agenda for Research Evaluation

Rapid advance in educational research, development, and actual instructional innovation will be impossible until a pattern of order and effective cooperation is established among school districts, state school offices, universities, and federal funding agencies. Although many excellent things are now being done, a survey of the nation as a whole would show a discouraging lack of systematic effort and a waste of time, energy, and resources.

We are fully conscious of the importance of the state's responsibilities for the schools, and we are anxious that the states play a greater role in public education than they have in the past. To this end, we urge the strengthening of the state offices of education to enable them to provide more effective leadership. We recognize, however, that there is a very urgent need for more adequate national perspectives on educational problems and more decisive national action in the improvement of education. The findings of educational research and evaluation are of worth to the schools throughout the nation. Most school districts and many states, moreover, cannot afford to conduct major research, experimental, and evaluation projects without financial assistance. We therefore urge the expansion of government and private financing of research in all phases of educational theory, practice, and evaluation.

We believe that all whose decisions affect the organization and administration of education should work toward effective partnerships among various levels of government and among the districts and states. These partnerships should share information, cooperate in research, development, and evaluation, and support the joint establishment of demonstration and pilot projects too large for single districts or states. Private business and industry should work with both public and private educational agencies in support of research and developmental projects. We expect industry to play an increasingly important role in education, both through its own projects and the financial support of educational research agencies.

We urge the development of prototype model systems that can exhibit new learning materials and new methods and techniques of learning to both the profession and the public. There is need for more effective techniques for the dissemination and practical implementation of research findings. Unless the school systems are staffed with persons capable of actually doing something with research findings, their value will be entirely lost.

As indicated in the Introduction, to establish a national basis for developing an orderly and effective program of educational research, development, and innovation, we propose the creation of a Commission on Research, Innovation, and Evaluation in Education. Our proposal is presented in detail in the final section of this statement. It is intended to strengthen the present structure of educational research that is now funded largely by the Federal Government.

3: GOALS AND OPPORTUNITIES

No fact of contemporary life is more challenging to educators than the fact of rapid and continual social and cultural change. The advanced technology and practical inventiveness that are revolutionizing communications and industry have set in motion processes affecting the whole structure of our society. Not only are the economy and the material conditions of life affected; there are far-reaching changes in our intellectual and moral values, our politics, art, and religion. Everywhere there is a growing sense of urgency, and everything is subject to question.

In this world of change, the schools must ask: What knowledge is of basic value to our pupils? Beyond the skills of literacy and practical mathematics, what capabilities are most useful to them now and in the future? Who should prepare for assuming jobs after high school, who should prepare for going on to more advanced education?

This section deals with the goals of instruction, most importantly with the basic need for bringing to students both a respect for knowledge and those skills essential to getting and using knowledge. We stress the need to individualize instruction and suggest the opportunities which are now available to accomplish this and other objectives through preschooling curriculum reform, the reorganization of instruction, and the employment of the new resources for learning such as audiovisual and other media.

1. THE GOALS OF INSTRUCTION

It is not the task of the schools to provide final solutions for all problems, but rather to equip their students to face life's problems intelligently and effectively. The end result of competent instruction should be a desire and respect for knowledge and possession of the skills essential to getting and using knowledge. This means competence in verbal skills, especially the ability to read and write—to use language effectively in the identification and classification of facts and in the formation and communication of ideas. The quest for knowledge requires as well the skill of mathematical computation, the techniques of analysis and generalization, and the capacity for reasoning and a commitment to reasonableness.

It is more important to generate intellectual curiosity and a passion for knowledge, and to cultivate good habits of thought and inquiry, than to concentrate on learning countless detailed facts which may soon be forgotten or abandoned. This is particularly vital in a society such as ours, in which economic demands and the methods of industry and business change rapidly, and in which mobility in vocation and employment is widely accepted and practiced. To acquire basic intellectual and technical skills is of far more worth than simply to master a single specialized technique.

Knowledge and reason and their related skills must always lie at the center of the goals of instruction, but these goals refer also to the effective or emotional life of the individual and to his capacity for decision and action. The schools should be concerned with the relevance of reason and knowledge to personal and social values. They should enlarge the individual's social perspectives, sharpen his moral and artistic sensibilities, and strengthen his sense of responsibility and commitment to purpose.

To cultivate the creative talent of the individual is another basic task of the school. But the identification and cultivation of talent are difficult. They require instruction that avoids those classroom routines which tend to produce standardized effects upon the pupils. Fortunately, extensive research is now being done on creativity which should yield useful knowledge for future planning.

The Early Years

The schools have achieved their most obvious and unambiguous success in the area of the acquisition and communication of knowledge. This is not surprising. Most educational research has been in this area, and the methods and techniques of the schools are best adapted to this function of instruction.

But it is also here that the schools have experienced their most serious failures—notably the failure to bring the child to a successful mastery of the verbal skills essential to the further pursuit of learning. In countless cases this has its roots in the inability of children to learn effectively because of cultural deficiencies in their preschool and home environments.

Those who do not learn to read and write effectively are not only deficient in the basic tools for further learning. They are often lost from the mainstream of the educational process. They may develop resentments against social authority and formal education and become alienated from their teachers and school and from everything that school represents to them. Often they become dropouts with the risk of tragic failure.

If the efforts of the schools are to be fully effective, the children from many if not all segments of our society must receive regular educational services covering the early preschool years from at least the age of three.[1]

It is now known that far more can be learned at an earlier age than was formerly supposed, while the basic importance of acquiring the primary learning skills, especially reading and writing, in the beginning years is well established. The educational investment in the very early years yields the largest dividends in developing talent, skills, perceptivity, and creativity as well as in encouraging intellectual independence and self-discipline. The acquisition of these attributes by children in their early years will make them more receptive and effective learners later on, thus lightening the load now borne by the instructional staffs of the elementary and secondary schools and aiding them to teach more effectively and efficiently.

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[1] On the basis of experience with the Head Start program for culturally deprived children, the per pupil cost of extending the program is estimated at close to $1,400 per child. Thus, if the program were to be extended so that it reached 80 per cent of the 2.5 million children between the ages of three and five of families within the poverty level it would cost about $2.8 billion.

It is increasingly evident that our educational needs are not adequately satisfied by the schools as they are now organized. Whether the establishment of the large numbers of preschools that appear to be required should be accomplished under the present school establishments by adding preschooling to the traditional format, or outside of these systems, is a difficult question to answer. There are both advantages and drawbacks to either proposal. This Committee favors the development of a mixed "system" of preschooling, through the encouragement of both private and public preschools, with a place for nonprofit schools, supported both by public and private moneys, that will serve as demonstration units.

> **We believe that early schooling is probably desirable for all children and that it is a necessity for the children of culturally disadvantaged areas. We therefore recommend extensive experimental activity in preschooling, not only in the substance and processes of instruction but also in organization, administration, and finance. We urge the establishment of both public and private nursery schools, especially in the neighborhoods of the disadvantaged. There is room for much development in this direction by those industrial and business firms which employ large numbers of women, particularly by those firms that are establishing facilities in the ghetto areas.**

Reform of the School Curriculum

Perhaps nothing has more dramatically demonstrated the possibility of improving the quality of education than recent curriculum reforms. Curriculum reform began with mathematics in 1951 and has spread to physics, biology, chemistry, elementary-school science, English, modern foreign languages, geography, anthropology, economics, and other social sciences.

The relative success of the movement has been due in part to the fact that the curriculum projects have usually been under the direction of persons who are willing to break with educational custom and tradition. Most important, those projects have joined the efforts of highly competent subject-matter scholars and skilled teachers to those of specialists in educational theory and practice and technicians competent in the new technology.

The major curriculum projects have produced an updating and upgrading of course materials and have developed techniques for more effective teaching with those materials. They have also placed knowledge and the methods of obtaining and validating it at the center of the school's activities. In general they have made the classroom and laboratory more exciting and rewarding for both students and teachers.

There are three aspects of curriculum reform that give us special concern:

First: Some recent efforts to improve the curriculum have failed to produce materials that can be employed effectively in the context of the newer instructional systems, which depart radically from the traditional patterns of personnel organization, scheduling, group composition, individual progression, and school architecture. Curriculum improvement should keep pace with the new concepts of organization and method. It should recognize the value of multi-media, man-machine systems of instruction and make use of them when it is economical to do so.

Second: The curriculum materials and methods developed have been adopted by far too few schools. Thousands of children and youth are still being taught an outdated science by outdated methods, even though the materials are available for bringing their education up to date. Others are taught with improved materials, but by inadequately trained teachers using old methods and techniques that yield negative results because they are inappropriate for those materials.

Third: The curriculum study projects that are now under way should be the beginning of a continuing effort to reconstruct both the substance and methods of education from the ground up to insure that the schools keep in touch with the world in which their students live. There must be some guarantee that teachers and students have access to both up-to-date knowledge and improved techniques of instruction.

Recognizing the improvement in the quality of instruction that already has resulted from the curriculum study projects of recent years, we recommend the continued funding of such projects by both public and private agencies. These studies should be extended to cover the entire spectrum of the school curriculum. The joint efforts of subject-matter scholars, education experts, and technicians are essential to the effective upgrading and updating of instructional materials and methods in all fields. Publishers and other producers of instructional

materials and manufacturers of educational equipment should assume a larger responsibility in this enterprise.

Re-examination of Goals

Both long-range educational purposes and the immediate goals of instruction must be continually re-examined and revised in light of changing conditions and new possibilities. The difficulty of this task issues from the uncertainties in current knowledge of human behavior and motivation, from the comparative inadequacies of contemporary learning theory, from failure to relate successfully means to ends in the educative process, and from the hard task of relating knowledge and the pursuit of knowledge to practical personal and social problems.

Whatever else may be set as a proper goal of education, it can at least be said that a school does not fully succeed unless it makes learning an interesting if not exciting experience; unless it effectively generates intellectual curiosity, a love of knowledge, and an open mind; unless it encourages a genuine incentive to create and the ability to think clearly; and unless it magnifies the self, establishes personal identity, and encourages individuality. The schools cannot expect to achieve ideal results. There are differences among both pupils and teachers, differences in their backgrounds and abilities and in their motivation and commitment. There are also limitations on the material resources that the nation can devote to schooling. Both failures and successes are to be expected, and there will always be variances in the level of the quality of different schools. But this does not mean that the schools should not set their standards high.

In stressing the value of knowledge, we are not proposing that the elementary and secondary schools be designed simply as preparatory to college and university education. Far from it. Although an increasing proportion of young people should seek university educations, many others should receive good vocational educations on the secondary level or should go on to technical schools or to vocationally oriented programs in community colleges. We believe that for the good of individuals as well as society, the secondary and post-secondary vocational and technical schools should be greatly strengthened. Jobs and income must be available to the youths who enter the labor force early. Technically trained manpower is essential for business and industry and for the general economic and social health.

2. INDIVIDUALIZED INSTRUCTION

We are especially concerned with the problem of equality of opportunity in education. In a free society, equality of educational opportunity is a basic ideal. However difficult it may be to achieve, it should always be kept as a civic goal. The individual's schooling is the best gateway to a satisfying, productive life, and full education is the best hope for a just society.

Whatever else is done to promote full educational opportunity, there must be a maximum effort to achieve more individualization in instruction. Only by this avenue is there hope for success with each individual—with the physically, mentally, or culturally disadvantaged—or with those who are especially gifted, who possess exceptional intellectual or artistic abilities.

By individualized instruction we do not mean a simple tutoring procedure. We mean instruction that is designed for the individual student rather than for an entire class. At times the individual will receive personal attention from the teacher. At other times he may be a member of a large group. At all times the school's resources are utilized to the best advantage of his intellectual growth. The differences among children require careful consideration if the learning experiences of the individual child are to be effective and rewarding. Individualized instruction is a good thing for all children; for the highly gifted and for the child of the ghetto and the slums it is essential.

We believe that it is now possible, in terms of both techniques and cost, to provide instruction that is effectively geared to the individual, to his learning capacities and interests, and to his personal problems. This can be accomplished if the schools take full advantage of the slowly growing body of competent learning theory, the possible uses of diversified grouping and scheduling, and the improved uses of instructional talent through the new staffing patterns that differentiate teaching personnel and their functions. These, when coupled with the wise exploitation of both the old and the new educational media, should provide invaluable instruments for bringing instruction directly to the individual student.

Emphasizing the individualization of instruction brings a new and personal dimension of education into the center of concern—the teacher's knowledge of the learner. Effective instruction requires more than knowing something to teach and having a practical grasp of good teaching methods. It requires a knowledge of the learner—his background, motives, interests, perspectives, and attitudes, his hopes and aspirations or his hopelessness and lack of aspiration. There is often little chance of success in instruction where the child as an individual person is not known to the teacher. This is a fact which must receive central attention in the reconstruction of teacher education.

The Organization of Instruction

The organization of instruction offers numerous possibilities for improving a school's effectiveness. The problem is to deploy staff time, energy, and talents more effectively than is now commonly the case. A flexible arrangement of student groups is required to provide more meaningful contacts with teachers and student peers than has been customary in the traditional classroom, and to permit a maximum of independence for those who are capable of pursuing their studies on an individual basis. This is especially important where the new media are enlisted for instructional purposes. The traditional grouping of students simply by age or years in school ignores the importance of treating every person in accordance with his individual needs and talents.

By team teaching, a technique of cooperative teaching that has already been widely employed, the special talents of teachers are combined to focus on major elements of the curriculum. Team teaching utilizes teachers in different functions in accordance with their own special abilities, interests, and education and in keeping with the variety of the curriculum and the needs of individual students. Through a flexible staffing pattern that uses teacher interns, aids, clerks, and media technicians, team teaching enhances the possibility for a school or school system to obtain the best returns on its investment.

The quality of education can be improved at relatively small additional costs where competent assistants of varying talents and preparation are employed to supervise routine and other matters both in and out of the classroom, thereby freeing the regular teacher for tasks which are more appropriate to his abilities. Communities can often provide competent and committed persons who cannot obtain full teacher certification, but whose talents are very valuable to the schools when utilized as assistants. These assistants should comprise a breadth of supportive talent in operating computers, projectors, and other media equipment and in performing routine clerical duties.

An Emerging Instruction Pattern

The traditional practice of placing approximately 30 or 40 students in a box-like classroom and staffing this unit with one teacher is under serious challenge in the modern school. Systems theorists have been examining this simple organizational pattern with increasing skepticism. There is now emerging a more efficient system with a comprehensive, flexible staffing pattern and with instructional system packages that permit greater personal contact between the teacher and the individual learner. While we do not suggest that there is an ultimate or final organization plan, there is a clearly discernible pattern common to many of the latest innovative developments across the nation.

In the new view, teaching and learning activities in schools can be classified under three categories: (1) lecturing, explaining, and demonstrating; (2) independent study and inquiry under supervision; and (3) discussion involving the teacher with small groups of students. An analysis of these categories can lead to a more sophisticated organizational plan for instruction than now generally obtains.

There is an increasing realization that too much teaching in traditional schools is devoted to the functions in the first category—i.e., mainly talking on the part of the teacher and listening on the part of the student.

Lecturing as carried on in the traditional manner is not usually an efficient use of the time of students and teachers. The lecturing, explaining, and demonstrating function of teaching can be produced in a studio and placed on films or video tapes. These can be available for selective use by the teacher on the basis of diagnoses of individual needs that become evident from the dialogue taking place between the teacher and small groups of three to eight students. The teacher can simply prescribe the lecture and delegate to an assistant the routine matter of showing the film or video tape before a small tutorial group of students.

In many advanced schools, the basic instructional unit has been increased from the customary 30 or so students to 90 or even 120 students. The group is housed in a large, open, carpeted area staffed with a team comprised of assistants, interns, and media technicians, who function in subcenters around a learning center containing various instructional resources.1/ The certified teacher-to-pupil ratio is increased to 45 or 50 to one, with staff dollars deployed to employ assistants and

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1/The floor plan of a typical learning center is shown on page 57.

to purchase audiovisual and other equipment and materials. Through the more efficient use of lecture and independent study activity, made possible in part by the new instructional techniques, there will be a decreased demand on the teacher's time. This, in turn, makes possible a closer and more personal relationship between teacher and student.

This emerging new pattern of organization for instruction should be developed more rapidly. At the current rate of change it will require decades to transform the classroom teaching system into this more open, adaptive, man-machine system.

We recommend continued and more extensive experimentation in school organization to eliminate the regimentation of students that results from the conventional class units and lock-step method of advancement. We believe that the combination of differentiated staffs, team teaching, and variable student grouping, together with the use of instructional television and other audiovisual media, has much promise for individualizing instruction.

3. THE USE OF THE NEW RESOURCES

Technology may be a powerful factor in the achievement of educational goals where the instructional program is planned by competent designers and the instruments are employed by properly prepared and skilled teachers. The use of advanced techniques in instruction can free teacher time for more intensive individual counseling and tutoring and can extend the range of the teacher's influence by enabling a closer relationship between teacher and student. Educational technology can serve as a vehicle for developing cooperation among teachers and can aid in overcoming the isolation of individual teachers and classrooms that has commonly resulted from traditional patterns of school organization and teaching. A more efficient deployment and specialized use of faculty personnel is one of the new instructional technologies and techniques. These are described in a special section entitled *"The New Resources for Learning: a Brief Guide,"* on pages 53-57.

Educational equipment and methods may disclose new objectives in education that otherwise may have been ignored. The development of new means often influences the judgment of which ends are worth achieving. More effective teaching techniques may be expected to affect both the goals and substance of education, just as improved methods of communication and travel have importantly influenced our values as well as our behavior.

The Teacher and the Machine

Effective employment of the new instructional technology will demand new skills and at times a more rigorous education of the teacher.

Already a wide gap has opened between the child and the adult teacher in the matter of learning habits. The typical child has been reared in an environment of audiovisual electronics. Most of our teachers matured in a world of magazines and books. The child will read books—often more than his teacher read before him—but it is natural for him to learn through a variety of media. From their preschool years most children have been at home with television and radio, and the most complicated electronic devices often seem less mysterious to them than to their parents and teachers. It is a major educational asset that for the child there is nothing alien about the advanced technical equipment and methods that may be employed in his studies or which may be available for use in his home.

Properly employed, the new instructional technology will assist the teacher, but it will not displace him any more than computers or the other advanced technologies applied to clerical work have displaced white collar workers. Moreover, instructional technology can contribute to the humanization and personalization of the school. The new learning resources should encourage rather than discourage the reading of books. Our schools must be well supplied with printed materials in the form of texts and specially prepared collateral readings. Fortunately the new texts are generally of superior quality, for they are often the product of collaboration among subject-matter specialists, educational theorists, and teachers.

The error of the past has often been the failure to integrate the use of technical equipment into the basic planning of a course of study. This has been in part the fault of the schools of education, which too often have failed to educate teachers in the effective employment of audiovisual equipment and materials. The suppliers of textbooks and course materials have given insufficient attention to the technique of meshing audiovisual materials with printed texts and programs.* As a result, audiovisual instruction has not reached its full potential as a means of enriching subject matter and of conveying information and cultivating attitudes. Valuable equipment often lies idle in school storage closets because its use as an educational instrument has not been understood or appreciated.

There are encouraging signs that progress is being made in the use of conventional audiovisual instruction. The educational value of moving pictures, for instance, has been greatly enhanced by extensive experimentation, especially in teaching the physical and biological sciences. The new curricula involve texts, guides, achievement tests, examinations, and films, as well as laboratory apparatus and other materials. In such instruction, the printed and audiovisual materials are integrated and the teacher has the advantage of presenting to his students professionally prepared films utilizing the talents of some of the nation's outstanding scholars.

The problem is not different in the employment of the newer technical instruments such as computers, television, or other sophisticated audiovisual equipment and materials. They make their greatest contributions as educational instruments when developed and employed as integral parts of instructional systems. Television, for instance, should be effectively combined with other instructional techniques, e.g., group discussion or laboratory activity. Even the best teachers are capable of profiting from its uses when it is integrated with their work and when they participate in the over-all program planning. This participation is essential. The instructional system in which television or other audiovisual media is included requires expertness in teachers, technicians, curriculum planners, and back-up personnel.1/ The teacher in the studio and in the classroom or laboratory must plan and work together in a team.

As is true in the case of the conventional media, the newer techniques do not adequately serve some purposes. Their successful use requires the recognition both of their strengths and their limitations. They are not useful, for instance, in some forms of discussion, supervision of activities, consideration of unanticipated questions, or individual consultation.

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*See Memorandum by MR. WILLIAM BENTON, page 74.

1/Television has been effectively and extensively used in teacher training in economics. This usage was developed under the auspices of the Joint Council on Economic Education, established through the encouragement of the Committee for Economic Development.

It is vitally important that schools and school districts guard against the premature purchase and use of mechanical and electronic devices. This is a question not only of getting value for the money but also of the quality of education.

Individualization of Instruction through Technology

The capabilities and limits of both the older and newer techniques must be clearly established by continuing research in relation to specific educational goals and subject matter. This is nowhere more true than in the area of computer-assisted instruction (CAI).

Research and experimentation in the employment of electronic computers in instruction are in their early stages. There have been successes and failures, but there are grounds for expecting that the remarkable capacities of computers to enhance the capabilities of the human mind in science, industry, government, and communications can bring new and valuable dimensions to education. Nevertheless, research and experimentation in this field are comparatively new and much remains to be done before a clear picture of the value of computer-assisted instruction can be drawn. A further problem, which is dealt with later in this statement, arises from the present great costs of any extensive nationwide use of CAI.

The primary value of employing computers in instruction is their capacity to contribute to the individualization of instruction. This is due especially to the memory and logical powers and endless patience of the computer. The computer's memory powers enable it to provide a detailed collated memory of student responses for purposes of automatic processing. This, together with its logical powers, enables the computer to organize information in structures dependent on the specific characteristics of the individual, characteristics that differentiate him in terms not only of learning speed, but also of interest and the capability for dealing with new situations.

The employment of computers is intended to establish an effective interaction and interchange between the student and the instructional system, with the system providing learning conditions responsive to the student's performance. The capability of CAI to adjust learning environments to the cumulative trend of the student's responses has been experimentally exhibited in these several types of activity relevant to instruction: drill or practice, inquiry, tutorial instruction, authorship, and the production of varied instructional materials appropriate to the individual student.

There is also a very promising development in the use of computers in specialized instructional situations, as in the use of computer-based learning systems for beginning and remedial reading. Such systems, employing both audio and visual responses, function in an environment that is directly responsive to the interest and expressions of the individual child, have proved to have remarkable capacities as a therapeutic agent in the education of some types of exceptional children.

Judging the Value of the Technical Resources

In weighing the capabilities and limits of the instructional technologies, it should be borne in mind that what works in one case may be of no value in another. To determine the proper use of the technical instruments and the role of the teacher in their utilization, these questions should be kept in the forefront of educational planning:

> Can the proposed technique be effectively employed in the cultivation of an open, inquiring mind? Or does it tend to produce conformity, dogmatism, and regimentation of thought?
>
> Is it capable of communicating and facilitating an understanding of complex concepts. Or is its usefulness limited to the management and manipulation of simple ideas?
>
> Is it capable of cultivating sensitive insight, originality, analytical facility, and creative intellectual skills?
>
> Can it be employed to induce and deepen artistic and moral sensitivity and appreciation?
>
> Do the benefits gained justify the costs incurred? Is the initial cost affordable?

These questions are fashioned largely in terms of educational ideals that will always be difficult to realize or even approximate. They can serve, nevertheless, as norms that can be useful in judging the value of instructional techniques.

In the development, administration, and employment of programs involving the use of technical instruments, the following general guidelines should be observed:

> Concern for speed, efficiency, accuracy, and economy should be balanced by an interest in educational quality and humane values. We cannot overstate this principle. Like any other method, the new technology is justified only where it results in instruction of higher quality, though always taking cost into consideration.
>
> Optimum diversity of the curriculum and the multiple goals of instruction require variety in teaching methods. The instructional uses of television, film programs, or computers have both strengths and limitations. Those strengths and limits must be carefully established by achievement testing and experimentation.
>
> The new instruments must be programmed with maximum flexibility and versatility if their use is to capture some of the more obvious values of the conventional teaching methods.
>
> On the basis of the relatively limited experience to date, a mixture of techniques has proved more desirable for most purposes than concentration on a single method or instrument. Particular techniques should be evaluated in relation to specific tasks as they may not be applicable to the entire instructional program.
>
> Before decisions are made on large and expensive changes in instructional patterns, the values of the new technology should be carefully weighed in every case against the values of conventional methods and new patterns of instructional organization. The comparative evaluation of methods is a complex task involving differences in instructional goals and organization as well as in subject matter and techniques.
>
> Judgment and decision on the new technology must be made on the basis of extensive experience and expert analysis. The persuasion of rhetoric and the desire for institutional status can seduce schools into making large expenditures for equip-

ment which may be poorly adapted to their purposes or which they are ill-prepared to use successfully. A sound decision involves an understanding of the whole complex of human values, side effects, etc. Research and experimentation in this area are expensive and difficult. They must be conducted at a high level of expert competence to avoid eventual waste in money and effort, and they inevitably entail risk and the possibility of failure. This is a national task that reaches beyond the resources of the vast majority of individual school districts.

Manufacturers of educational equipment should expand their support and conduct of research and development in the effective uses of such equipment. In doing so, it is important that they include in their planning competent representatives of the teaching profession. Every effort should be made to evaluate the effectiveness of instructional equipment in terms of the long- and short-range purposes and goals of education and the economics of their use. We recognize the responsibility that rests upon this industry in the marketing of its products under conditions that will assure the schools a proper return on the large investment incurred in the employment of technical equipment.

Educational technology provides the means, not the ends, of instruction. The quality of instruction can be no higher than the level of the teacher's competence and skill and of the substantive materials which he employs. More progress has been made in the development of instructional "hardware" than in the production of the "software" that carries the instructional substance. This gap must be closed.

We wish to stress the great need for extensive research, experiment, development, and evaluation in educational technology. This requires well-financed and expertly staffed centers that have effective working relations with experimental schools and with teacher education institutions. We urge the establishment of such centers. We believe that private, nonprofit agencies and producers of educational equipment and materials can contribute importantly to this work.

Furthermore, we believe that Regional Educational Laboratories established by the United States Office of Education will be important factors in future educational research.

One further observation should be made. It concerns the growing need for standardization as new devices proliferate in the fields of audiovisual and television instruction and computer-assisted instruction. Not all the equipment manufactured by the producers is compatible, a problem not unlike that experienced in the earlier days of phonograph recordings and commercial television.

Recognizing that the use and manufacture of instructional audiovisual and other equipment is both a national and international enterprise, we are concerned with the establishment of standards to insure both technical quality and compatibility. We believe that such a body as the Education Commission of the States is in an excellent position to implement this proposal. This body, which has a membership of 45 states and territories and is devoted to further a working relationship among state governments and educators for the improvement of education, might usefully appoint a study committee to work with industry representation in the development of such standards.

4. *THE TEACHERS— INCENTIVES AND EDUCATION*

The teaching profession is challenged today as never before. The successful teacher must know his subject. He must keep abreast of the steadily increasing knowledge in his field as well as advanced developments in instructional methods. He must be responsive, moreover, to the growing social responsibilities of the schools, a task which requires understanding the social and cultural backgrounds of his pupils. How to provide competent teachers in adequate numbers is one of the nation's most persistent problems.

The solution of this problem requires more effective recruitment of capable persons for the teaching profession and a great improvement in the academic and professional education of teachers. The chief attraction of the teaching profession is the satisfaction of being an effective teacher. If the profession is to succeed in its efforts to recruit persons of high ability, the schools must provide the conditions which will make genuinely successful teaching possible. Basic to those conditions are adequate back-up assistance, effective participation in the development of the educational program, clear decisions on the educational functions of the school, and improvement in the financial compensation of teachers.

Changes in Staffing, Certification, and Salary Schedules

The differentiation of teaching staffs by introducing such categories as master teachers, teachers, assistant teachers, interns, and media technicians should improve teaching competence for specific tasks and raise the level of professional morale and dignity among teachers.

Flexibility in scheduling, school architecture, programming, and in the general use of time and talent should make teaching more attractive and rewarding. The effective employment of the new curriculum materials and the new technology should enhance the professional status of teachers, creating new opportunities for them in such positions as television teachers, specialists in computer-assisted instruction, or as experts in curriculum-method problems. This should open to teachers new avenues for advancement as alternatives to moving into administration.

In our opinion, state teacher certification agencies should examine critically their certification policies and regulations to ensure that persons competent in the highly specialized skills required in modern teaching are not disqualified from teaching by irrelevant formal requirements. Wherever necessary, regulations should be modified to enable the schools to appoint sub-professionals to the back-up staffs of certified teachers.

The simple standardization of teacher classification, certification, and pay scales, which is common today, places everyone more or less in the same category and fails to recognize differences in competence, knowledge, and interest.

Teacher salaries are commonly based on seniority and the accumulation of college credits. We regard this as a serious block to the recruitment and retention of countless competent teachers and to eliciting the best efforts of teaching staffs. The variety of talent, preparation, and competence required for effective and efficient teaching justifies differentiated pay scales, which in our opinion would overcome this block to improved instruction.

We believe, moreover, that the standard practices in the payment of teachers are unfair to teachers of uncommon ability or those charged with special responsibilities. Both individual teachers and teachers' associations, moreover, should recognize that in the long run the compensation of teachers would be greatly increased if the teacher's pay were effectively geared to his competence and function. The common structure of college and university faculties and the typical pattern of their pay scales clearly exhibit the wisdom of such arrangements. With collective bargaining becoming increasingly the pattern for the determination of salaries and salary schedules, we recognize that such a move would be difficult. We are convinced, however, that the bargaining agencies for teachers would make greater gains by abandoning the traditional bases of teacher pay.

> **We urge school boards, school administrators, and professional teachers' organizations to undertake a reconstruction of the basis for teacher compensation to bring pay scales more in conformity with the functions, responsibilities, and performance of teachers. Such pay scales should also take into account the shortages in certain teaching skills.**

Innovation in Teacher Education

The task of providing competent, effective teachers for the schools rests upon the colleges and universities—not simply upon the schools or departments of education. For no school of education can successfully meet this obligation unless it has the full cooperation of, and cooperates fully with, the entire university. The education of teachers deserves and must have more support from university presidents and trustees than it has commonly received.

No person of ability who aspires to professional success is satisfied with less than good preparation. We are convinced that strengthening teacher education will attract more people of ability to the teaching profession.

More of the same old thing will not improve the education of teachers. Those schools of education that have critically examined their general purposes as well as their practices, and have been capable of radically changing their curricula and methods, have made the longest strides toward producing the kind of teacher who can come to grips effectively with the difficult tasks of contemporary education.

Such institutions are capable also of providing educational leadership by generating new ideas, conducting worth-while research, and organizing experimental and developmental activities in cooperation with state agencies and elementary and secondary schools. The failure of educational research to transform more effectively the quality of the schools follows in part from the shortage in the school system of people who are capable of understanding the work of research scientists and employing their findings in practical usage.

Schools of education should examine their curricula to ensure that their pedagogical studies are effectively tied to educational purposes and goals, subject matter studies, and the improvement of school curricula and instructional technology. The preparation of teachers should be geared to the major developments in educational research and to the improved staffing patterns of the schools. The schools need variety in the talent and function of their teachers rather than sameness and standardization. They need teachers who are capable of grasping the value of new ideas and are able to move in new directions when the evidence warrants.

We urge the institutions engaged in the preparation of teachers to design their curricula to include adequate instruction in the values of research and the uses of advanced educational media. Institute programs to upgrade and update teacher competence have already proved their value. These programs, made available at leading universities to practicing elementary and secondary teachers, should be designed to improve both subject matter competence and capability in utilizing advanced teaching technology.

Educating for the Future

Teacher education institutions should examine the value of the new tutorial and clinical programs in the undergraduate education of teachers. To prepare teachers and administrators to cope more adequately with the problems of the modern school, college curricula should be designed for fifth-year and graduate programs.

Nor should the education of the teacher end when he leaves the college or university and joins a school faculty. It should be a continuing process involving in-service programs, summer and academic-year institutes, and frequent college refresher courses in subject matter. This is particularly important for those engaged in teaching the culturally deprived.

Most teachers today know far too little about human motivation and behavior or of the social and cultural forces which affect the individual. There is a desperate need for teachers to gain reliable knowledge relating to the special problems of the culturally and socially deprived. Schools of education should generate a greater concern for human values in a technological, industrial, and urban age and prepare teachers to contend more effectively with the practical problems that arise in the daily experience of their pupils. The irrelevance of much education is one of the most serious failures of the schools.

In the preparation of teachers there is no substitute for knowledge. Fortunately, there is a growing realization that the professional teacher at every level must have a good liberal education and genuine capability in the subject matter which he teaches. This requires full cooperation between the schools of education and the colleges of arts and sciences, cooperation which is already found in those institutions which are most effective in educating teachers. There the subject matter departments play a major role in ensuring the teacher's competence in his field.

For effective teaching, different subject matters require different methods. Research on the techniques of teaching specific subjects should be done through cooperative arrangements involving both the colleges of education and the schools. Private publishers, equipment manufacturers, and distributors can contribute importantly to that research where it involves innovations in text materials or the use of moving pictures, television programs, computers, or other equipment and materials.

THE NEW RESOURCES FOR LEARNING: a Brief Guide

This brief guide is intended to give the lay reader a quick comprehension of the developments in instructional or educational media. These embrace a wide variety of materials and equipment, from motion picture film and projectors to computers and the programming that is employed with computer-assisted instruction. Included are various systems, involving the intermixture of several different kinds of audiovisual or other equipment. Also included under the general heading of instructional media are conceptual approaches to teaching, such as programmed instruction.

Audiovisual Materials and Equipment

A variety of materials to aid instruction has been available to the schools for some years, employing the use of such equipment as *tape recorders, record players, slide and filmstrip projectors, overhead projectors (for transparencies), motion picture projectors,* and *radios.*

Whether these employ sight or sound, or both together, they are grouped as audiovisual materials. They are also frequently referred to as *conventional aids,* though the term is somewhat misleading. New uses for the equipment have been devised, sometimes in combination with other media or equipment. Meanwhile there has been considerable technical advancement in the design of equipment, resulting in easier and more flexible classroom use of audiovisual material, through cartridge loading, self-threading projectors, and remote push-button control.

Of particular note have been the advances in 8mm. film and projectors. Sound is increasingly used, giving 8mm. materials greater importance and impact. The introduction of the so-called *film loop* also has widened the uses of 8mm. materials. This device employs a repetitive film in a cartridge that rewinds itself and is simple to use. This has made for easy use in the classroom, and it has also facilitated the use of 8mm. for individual study. Film loops have proven especially useful for short *single-concept* films on a particular subject or demonstration, which students can see many times.

A similar development has taken place in *audio tape* with the introduction of the *cassette,* containing a repetitive loop of tape. This device is likewise easy to use and re-play.

The audiovisual field has been augmented in recent years by *television*. The TV set in the classroom can receive programs, either live or pre-recorded, from central broadcasting studios. Or it can be employed as an independent audiovisual unit through the means of *video tape*. Programs of all kinds can be recorded on tape and kept on hand in school libraries for use as needed, as in the case of motion picture films. This frees teachers from the rigidities of scheduling imposed by central broadcasting, which is confined to the use of a limited number of channels at any given time.

Various video tape slave units for the re-playing of tapes through television sets are now on the market. As of the present, these slave units are several times more costly than motion picture projectors, but there is a probability that less-expensive equipment may be offered in the relatively near future. Eventually students should be able to check out video tapes from the library for home use.

In the broadcast mode, dissemination of TV programming can be accomplished either through the use of ground stations or airborne equipment, or by means of closed circuit television (CCTV). Broadcasting for instructional use by educational institutions, either to the school or the home, is referred to as *instructional television* (ITV) to distinguish it from *educational television* (ETV), which serves a broader cultural and informational service to the general public.

Aside from its employment in classroom instruction, television has other uses in the educational process. Television is useful in the training of teachers, particularly in the improvement of teaching skills in conjunction with such techniques as *micro-teaching* by enabling the teacher to criticize his own performance on video tape. Television facilities in the school also provide a communication instrument between administrators and both staff and students.

Various instructional systems utilizing audiovisual and other equipment have been developed, the most familiar of these being the *language laboratory*. The purpose of the language laboratory is to develop listening and speaking skills in foreign languages. The system employs individual study *carrels* (booths) and the use of audio tape equipment and headphones in combination with other materials.

The *dial-access learning center*, which also employs carrels and headphones, makes it possible for the individual student to call up pre-programmed and recorded audio tapes, motion picture films, or other visual resources. It also gives the student access to off-air and closed-circuit television programming. A limitation presently is the number of channels simultaneously available, a problem that will have to be solved before the system can reach its full potential.

Programmed Instruction

Programmed instruction is a self-tutoring technique of moving by convenient and sequentially arranged steps from old knowledge to new knowledge. With programmed instruction the individual can advance in the study of a subject at his own individual optimum rate.

The technique was originally developed in conjunction with so-called teaching machines, but the use of these devices is minimal. However, the principles of programmed instruction have been adapted widely to printed texts; they are essential in various modes of computer-assisted instruction.

Experimentation has established that programmed techniques can be effective in teaching logic, mathematics, and languages; improving the capacity to recognize distinctions and alternatives; teaching reasons and explanations as well as conditioning for correct responses; providing for student independence in the choice of subject matter and goals as well as in the determination of learning speed; and cultivating high learning motivation in the student.

Properly employed, programmed instruction can free the teacher from much routinized work and can contribute to the conditions necessary for the non-graded school that would overcome the present lock-step method of pupil advancement.

In certain uses, programmed instruction offers opportunities to increase greatly the effectiveness and efficiency of the learning process. Borrowing a case in point from higher education, a graduate school of business has cut the time required for students to master an accounting course from 19 hours to about two hours through the introduction of programmed instruction.

Individually prescribed instruction (IPI) is a system for the utilization of programmed instruction and other instructional materials. The student's point of entry in this system is through a placement test, on the basis of which the teacher prescribes a course on an appropriate level for the individual student. The student proceeds with a designated worksheet, which is checked by an aide who directs the student to other worksheets according to his performance. As the student progresses, he will move on to other levels.

Computer-assisted instruction (CAI) employs a central computer with electric typewriters, light pens, audio tape, and other equipment as terminals for the use of students. The system can be used in various modes of instruction, as for example, drill or practice, inquiry, tutorial instruction, or authorship, as described on page 44.

In addition to its possible usefulness in furthering individualized instruction, the computer has the following advantages:

> It can provide conditions and capabilities for research on teaching under controlled conditions of individualized instruction.
>
> It can collect detailed records on student performance that help evaluate the effectiveness of both instructional materials and methods.
>
> It is useful in assisting teachers and authors in the development of instructional materials.

When employed in instruction, computers can provide remarkable versatility. Although research in this matter is in its early stages and the problem of specific objectives in education is complex and difficult, theoretically CAI can be employed for any subject matter that can be treated through the agency of books, films, or recordings.

It is important that central computers can be programmed for outlets widely distributed on a regional or even national basis. Teletypewriter equipment, which can be synchronized with both audio and visual instruments, can be connected with the central computer by the simple device of telephone lines.

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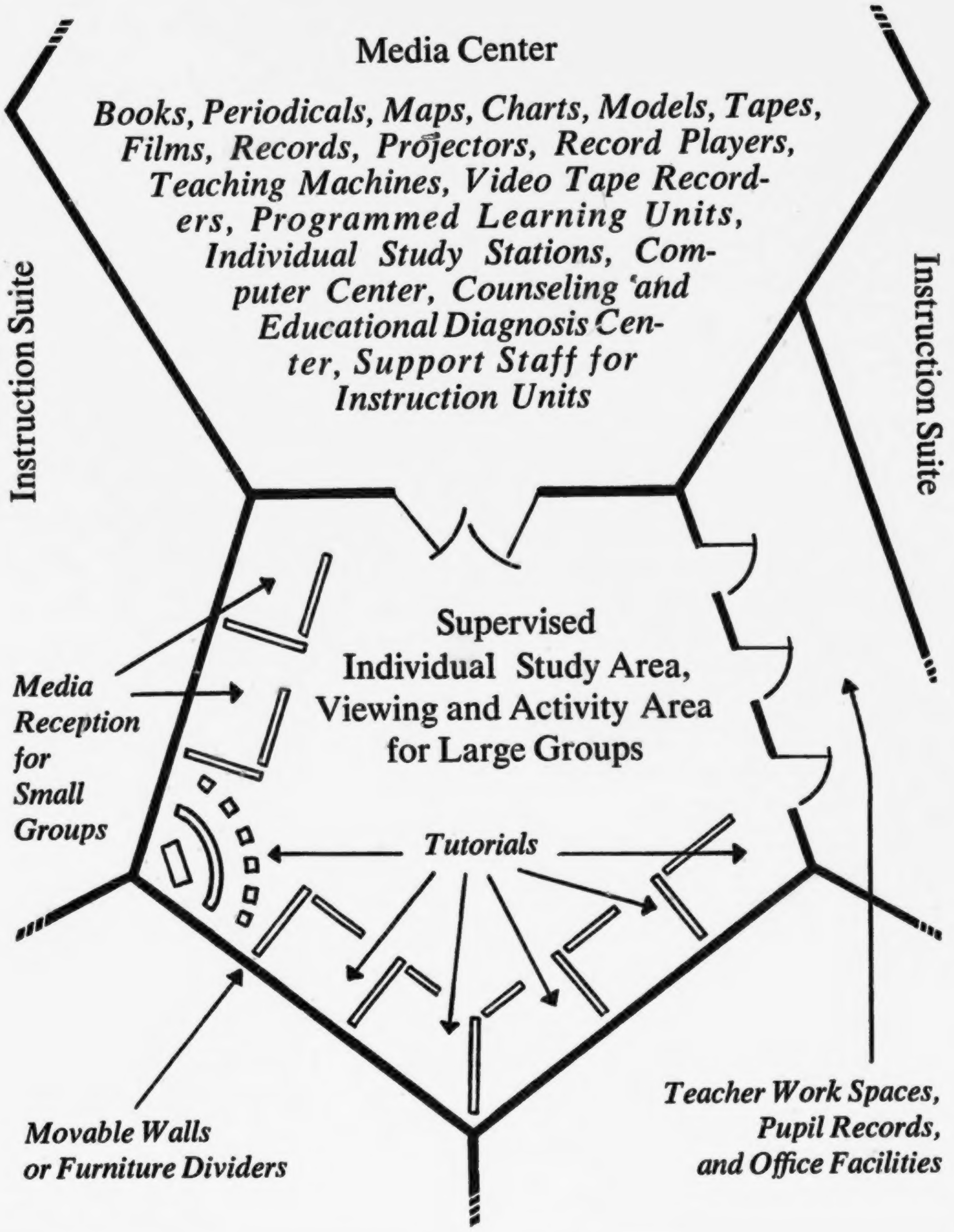
ADVANCED DESIGN FOR AN ELEMENTARY SCHOOL

Utilizing Media Systems and Team Teaching
to achieve Individualized Instruction


Media Center
Books, Periodicals, Maps, Charts, Models, Tapes, Films, Records, Projectors, Record Players, Teaching Machines, Video Tape Recorders, Programmed Learning Units, Individual Study Stations, Computer Center, Counseling and Educational Diagnosis Center, Support Staff for Instruction Units
Instruction Suite
Instruction Suite
Supervised Individual Study Area, Viewing and Activity Area for Large Groups
Media Reception for Small Groups
Tutorials
Movable Walls or Furniture Dividers
Teacher Work Spaces, Pupil Records, and Office Facilities

4: COSTS AND BENEFITS

In this statement we have made various suggestions for improving effectiveness in education. We believe that the reorganization of instructional staffing can be accomplished at a cost per pupil reasonably close to present school spending. But precise estimates of the costs of reorganizing instruction and other improvements are lacking. Also lacking are estimates of the benefits that these programs will yield in terms of their costs, and we will be unable to measure these benefits until a great deal more is learned through proper research and controlled tests.*

In estimating costs, many interrelated factors must be taken into account—the costs involved in establishing systems of research, in improving teacher education, in installing audiovisual or other types of instructional equipment, and so forth. We believe that such estimates must be made. To explore the possibilities of this approach, we have made comparisons of the costs that might result from the installation in the public schools of large-scale systems of television and of computer assisted instruction.

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*See Memorandum by MR. FRED J. BORCH, page 74.

1. *WHAT DO DIFFERENT PROGRAMS COST?*

It is fair to say that in the past the expenditure decisions made by school administrators have been mainly of an incremental type. That is, the given year's budget has followed the previous year's budget with respect to the distribution of money among the various school programs. The practice has been to incorporate work-load increases in the budget, and any extra remaining funds have often been spent on those programs having greatest political appeal.

This practice is an entirely understandable one. School districts have been under severe pressure to find the money to serve increasing populations. At the same time, there have been no clear guides for measuring school outputs. Nor was it possible in pre-computer days to process the enormous quantities of data needed to analyze and assess alternative patterns of resource allocation.

The capacity to process such data is now increasing at an almost infinite rate. Moreover, although many basic factors in education can never be quantified, it should soon be possible for school authorities to agree upon the matter of measurable outputs. Interest is now shifting to the identification of inputs, because it has become clear that education is a complex process in which the student's background and the background of his peers, for instance, are important factors in determining classroom learning rates.

The basic goals of instruction must be determined for the most part by the large purposes of education, which are rooted in the values of society. These goals cannot be established simply by measurement and computation. Nevertheless, it is possible to state many objectives in operational–i.e., measurable–terms in whole or in part. Where this is possible, the search for alternative processes or programs to achieve those objectives can be conducted on rational grounds, and choices among those alternatives can be made in part on the basis of cost-effectiveness analysis.

Thus, it is possible to indicate the broad outlines of the system of information and analysis required to gain substantial improvements in the process of resource allocation:

First, there should be systems on statewide bases for the collection of information regarding the characteristics of students, the characteristics of teachers, and the financial allocations in districts.

Second, in the larger school districts or in state departments of education, there should be offices of analytical studies to engage in model building, sensitivity analysis, and forecasting—the standard tools of planning, programming, and budgeting.

Third, there should be a setting in which serious high-grade applied research can be conducted. It is our belief that new kinds of schools, operating under a great degree of freedom and having the power to make contracts with private agencies for innovative programs, can make great contributions to educational progress. These schools may be regarded as clinical. It may be advisable for the clinical schools to be administered by bodies having no involvement with conventional practices. This has been accomplished in several districts by placing such clinical schools under public corporations independent of local school administrations or university departments of education.

This kind of educational inquiry system, consisting of the main components of information collection, analysis, and experimentation, would offer invaluable aid in choosing among alternative ways of expending money.

An Interim Approach

The building of educational inquiry systems across the country will take time, even though many of the necessary components already exist, such as research and development centers, regional education laboratories, and, in some of the more progressive states, the new data systems. In the meantime school administrators would be well advised to provide themselves with program accounting systems, through which they could discover the cost of all clearly identifiable activities in a school district. Program accounting in and of itself is not equivalent to planning, programming, and budgeting, but it provides the means for making cost comparisons.

Any spending proposal, such as raising the starting salaries of teachers, could be assessed against the other possibilities for spending the same amount of money—e. g., determining what this sum would purchase if spent on such programs as the retraining of teachers. It would remain a matter of judgment whether the benefits of spending the money on retraining teachers would outweigh the benefits of improved recruitment. The choice among such alternatives would involve many factors, as for instance the policies and bargaining power of teachers' organizations. But however difficult the cost-benefit analysis when such factors are included, it should always be in the picture.

Program accounting encourages school authorities to make useful comparisons of this kind. Perhaps most importantly, program accounting encourages the forecasting of the costs of new programs over a period of years. Grievous mistakes have been made in failing to take account of the cost in future years of programs that were superficially attractive but proved eventually to be bad educational investments.

Program accounting will be particularly valuable in comparing the benefits that may accrue from other forms of resource allocation lying outside the scope of this statement. We have in mind the possibility, now being explored in various parts of the country, of gaining efficiency in the use of school facilities through their use after hours for adult education or other programs, or through the lengthening of the present school year, a legacy of the nation's agrarian past. School districts would be well advised to explore the feasibility, in both human and financial terms, of such possibilities. Program accounting will assist decision-making by providing comparisons that take into account the various costs involved in such proposals as against alternative costs accruing, for example, from plant expansion to provide for new pupils.

We urge immediate exploration by school administrators of the application of program accounting techniques in order to identify costs in school systems and to take advantage of cost comparisons. The adoption of such techniques by school districts will be advanced greatly if assistance and leadership in this area are provided by state departments of education and by university schools of business, economics, and education. In applying cost-effectiveness analysis over the whole range of school investments and costs, we urge school districts to explore thoroughly the possible benefits that will result if the use of school facilities is extended by various means to include periods during which they are now unused.

Innovation and Incentives

The history of economic activity indicates that improvements in the allocation of resources under an existing technology yield significant but not major advances in productivity. Hence, while we strongly urge the development and use of educational systems, we also maintain that truly impressive gains in output will occur as and only as school districts make innovations in their programs.

With respect to the economics of innovation, we point out that the discovery of new ways to teach children, though a very demanding undertaking, is actually the least difficult part of the task of educational improvement. It is far more difficult to achieve *bona fide* changes in school programs and organization and to maintain these innovative practices in the face of conservative pressures that resist change or demand a return to the conventional mode.

Better information is needed about why certain practices succeed in some schools and fail miserably in others. Such findings should flow from the educational inquiry system. But at the same time it is necessary to establish stronger incentives for teachers and school administrators to effect productive change. In a system of weak incentives, one can expect the persons involved to pay lip service to innovation—to provide the shadow but not the substance of change—with the result that a half-hearted adoption of a new practice results in poor performance, which in turn disillusions others who might have tried it. We believe that the states and their school districts should establish systems of financial and other rewards for both teachers and administrators who are effective in producing innovations which increase the quality and productivity of the schools. Improvements in the quality of schooling deserve high recognition from both school boards and the general public.

2. *WHAT WILL THE NEW TECHNOLOGIES COST?*

We recognize certain limitations in the employment of cost analysis in education. Nevertheless, to illustrate the possibilities of this approach, we have experimented with a form of cost analysis to determine the extent to which it is practicable, in terms of cost, to make large-scale technological innovations in instruction.

We present our findings in the hope that they will stimulate further effort in this vitally important area. Our comparative estimates have taken into account only one side of the equation, the cost side. What must be undertaken are even more elaborate and complex studies that take into account the effectiveness or benefit side of the equation. And such studies should extend over the entire range of the new resources that have now been opened to instruction through scientific and technological advance.

We have assumed that if the new technologies are to be employed to their full potential, they must be integrated with the educational process through massive use far beyond any past experience in audiovisual instruction.

The present use of the teaching technologies offers little guidance here, either because of insufficient experience, as in the case of computer-assisted instruction, or because of spotty and intermittent use of audiovisual equipment and materials. Large-scale employment of the new instruments entails not only the installation of great quantities of equipment, but also the production of massive quantities of television programs, films, and computer programs. The situation can be compared with the early days of commercial television broadcasting, when the demand for material to sustain additional hours on the air far outran the capacity of then-available production facilities.

Variables and Offsets

What will massive use of the instructional resources cost? To answer this question we have selected for purposes of illustration two of the newer technologies, television and computer-assisted instruction. Outside consultants were asked to make an independent analysis of cost for the adoption of both these technologies in the public schools on a nationwide scale.[1/]

In presenting the data resulting from this analysis, we recognize that a number of variables are present that make it extremely difficult to assess definitively the cost-benefit ratios that would obtain if these two technologies were to be applied on the large scale assumed here for the purposes of costing.

One important variable is the use that the schools will eventually make of the various media now available or that will be available in the future. As regards individual school systems what will be the mix of audio tape, slide films, motion picture films, television programming, or other materials? We assume that all media will find some degree of use in future school organization and curricula. Furthermore, television, for example, has the capability of being employed either on a decentralized basis, through the use of video tape, or on a large-scale basis through dissemination from a central broadcasting facility. Whether these techniques are employed singly or together in specific locations

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1/These estimates were made especially for the Committee for Economic Development by Booz, Allen & Hamilton Inc.

will depend on local needs or preferences. Some school systems, for example, will prefer to use video tape exclusively to achieve the flexibility it provides in scheduling, as against the relative inflexibility imposed on the scheduling of individual schools through the use of central broadcasting at specific hours. However, whether or not central broadcasting is employed, there will be the costs of maintaining studio facilities and personnel for the production of video tapes, plus the costs of their actual preparation, distribution, and use.

A further question concerns the manner in which the material will be produced, for what purpose, and in what quantities. Again considering television, program costs can vary enormously. It costs about $50 an hour to televise a teacher presenting a lesson in the same manner as he would ordinarily present it in a classroom. If, to get maximum impact, the lesson is presented by a teacher who is trained in television techniques and who can plan and use props, sets, graphics, and camera rehearsals, the cost might be as high as $6,000 per hour. But this program would have a potentially wider audience of students, and video tape copies might be rented or traded among school districts. Production costs can run up to $500,000 an hour and higher for specialized information programs produced by commercial organizations skilled in mass-communications programs. This type of lesson should have wide use and appeal, with the result that rental cost for use in an individual school system might be reduced to perhaps $50 per hour through the mass-distribution of video tapes.

More important, to what degree will costs involved in new technologies be offset by raising the productivity of instruction and by redeploying present resources? Television, taken again as an example, has been employed successfully to compensate for teacher shortages, to provide education for remote areas, to change and expand curricula, to raise standards of instruction, to provide effective clinical and in-service teacher training, to instruct those who cannot attend school, and to make possible the sharing throughout a school system of the finest teaching in the sciences and arts. It is assumed that eventually the large-scale use of the new technological resources will help produce changes in instructional staffing, as we have suggested earlier, with consequent effects on the quality of instruction.

Despite the difficulty of making estimates of these offsets and of other variables, we believe that our cost studies of television and computer-assisted instruction yield significant data for consideration by all who are interested in the improvement of instruction.

Basis for Cost Projections

As a point of departure in the study, a model of a school system was conceived having certain basic characteristics, all of which can be varied.

Estimates were based on a system having (a) a student population of 100,000 in grades one to 12; (b) 152 schools of 24 classrooms each; (c) 30 pupils per elementary class and 25 per secondary class; (d) continuous operation through a six-hour school day for 150 days of the 180-day school year; and (e) one hour of instruction per student per day through television and one hour through computer-assisted instruction.

The accompanying costs included preparation and updating of lesson materials with an assumed three-year life; operating and maintenance costs; and 10-year amortization or rental of hardware. These costs are assumed to be additive. No change in generally accepted pupil-teacher ratios is anticipated. Nor is it assumed that classroom teachers will be replaced by the use of these innovations.

Range of costs for television: With television the key issues are the cost of a school system's materials, or "software," for lessons and the number of students in the system over which this cost can be spread. For the 100,000 student system model, the probable annual software cost would range from about $1 million to $3 million, depending on quality and the proportion rented rather than locally produced.

The probable initial hardware cost would be $1,250 per classroom, plus $100,000 for the school system's central studio and transmission equipment. Including amortization, operating and maintenance costs, the annual cost for the system would be about $1 million. This could at most be reduced about one-half by substantially lower quality, less flexibility, and fewer hours per student.

Directly proportional changes in software cost could be made from the model by changing the number of hours per day per class, the number of grades covered, or the number of days of television instruction per year. At a relatively modest level of, say, 15 minutes per day for the classes in half the grades, the initial annual software cost would be approximately $225,000.

This range of total system software costs would not be affected by the number of students in the system, in the individual classroom, or in the individual school. But cost per student hour would be lower for larger systems, thus making it more attractive to them and making greater use of rented or exchanged software by the smaller systems essential.

Since certain minimum equipment is required, television hardware costs are not as directly affected by variations in hours. The basic unit is the school. Estimated initial hardware cost for a 24 classroom school would be about $30,000. This is for an equipment complement of adequate quality, including one video camera, seven video tape recorders, and 48 black and white television sets.

The cost projections indicate that the cost of supplying a school system of 100,000 students with one hour of television programming a day for each student will range from $800,000 to $4.6 million a year. If television were optionally installed in the 16,000 public school systems that represent 75 to 80 per cent of our national elementary and secondary school population, the annual cost would range from $265 million to $1.5 billion.

Range of costs for computer-assisted instruction: Here the costs have a substantially different anatomy and magnitude than in the case of television. The basic hardware unit is the central processing computer plus the associated terminals at which the students work.

The calculations for the cost of computer-assisted instruction were based on the use of two modes:

> A *drill-and-practice mode* built around a central processing unit serving 1,200 students daily through 200 terminals, at an annual rental of $480,000. Programs are relatively simple, involving a set of repetitive exercises dealing with one learning event with which the student is already familiar. One hour of software costs about $5,000 to produce and $35 to rent. Assuming a reasonable mix of rental and production of programs, the annual software cost would be about $765,000 versus $20 million for hardware rental after discounting for cost reduction through mass production. About $6 million for other services would also be required, making a total of about $27 million for the 100,000 student system.
>
> A *tutorial mode* built around a central processing unit serving only 210 students daily through 35 terminals at $210,000 per year. Programs are relatively complex, involving a combination of programmed instruction and drill-and-practice, with the additional capability of random access. One hour of soft-

ware costs about $30,000 to produce and $210 to rent. With the same assumption as for drill-and-practice, annual software cost would be about $5 million, hardware rental about $50 million and other services of $17 million for a total of about $72 million.

Because, unlike television, the bulk of the cost of computer-assisted instruction in each mode is hardware rental rather than lesson software, the only real opportunity for substantial savings is in reducing the hours during which the computer is available for each student per day, thus requiring less hardware to serve more children. A reduction from one hour to 15 minutes per day per student and limitation of coverage to half of the grades would reduce the costs almost proportionately to about $3.5 million and $9 million.

If computer-assisted instruction were to be extended to the 16,000 school systems representing the bulk of the nation's public school students, the annual costs could range from $9 billion to $24 billion a year.

Need for Further Study

We present these findings with full recognition of the difficulties of making reliable estimates at this stage of development and with no thought of implying an endorsement of any particular instructional technology.

Total public school expenditures for the United States during the 1967-68 school year are estimated at about $30 billion, including operating expense and capital expenditures. Thus, the cost of annual operation for the large-scale use of television in the schools, ranging up to $1.5 billion, can be accommodated within the present range of expenditure. This is particularly so in view of the possible offsets of cost that we have mentioned. Furthermore, it should also be noted that there is considerable interchange of programs between instructional television and the other audiovisual media. For example, programs created for use on films can be transferred to video tape, and vice versa. Intensive development of television and of the other audiovisual media therefore provide mutual stimulation, raising the level of the state of the audiovisual arts, opening the way to new uses and techniques, and increasing the flow of programming available generally, thereby lowering costs all around.

On the other hand, at an annual cost ranging from $9 billion to $24 billion, the large-scale use of computer-assisted instruction requires too large an expenditure in relation to possible benefits at this time. Only a gradual acceptance of computers in instruction is realistic and then on an experimental basis, especially since this technology is rapidly changing. However, the record of United States industry for ingenuity in the rapid development of new technologies strongly suggests the likelihood that costs will be brought down in this field in the not-too-distant future, opening up the broader use of computers as the experiments with their use demonstrates its capabilities and potentials in instruction.

We strongly recommend that broad-based studies be made of the costs and benefits that can be expected if the various technologies involving audiovisual equipment, television, computers, and other devices are applied to instruction in the schools on a wide scale. Such studies should take into account the benefits that may be obtained through increasing the effectiveness of the learning process at the same time that they weigh the effects of the new resources in terms of the organization of instruction, teacher pay schedules, productivity, probable use by teachers, and other vital matters.

5: PROPOSAL FOR A COMMISSION ON RESEARCH, INNOVATION, AND EVALUATION IN EDUCATION

In this statement there has been a heavy stress on the need for greatly intensified and expanded research and development bearing on all aspects of schooling, for widespread efforts to introduce new curricula and more effective methods of instruction in the schools, and for careful evaluation of innovations and their influence on the effectiveness of education. Though we have confined our observations and recommendations to primary and secondary schooling, the changes called for clearly involve higher education as well, particularly in teacher training and retraining and in the substance of curriculum revision.

To strengthen the present national structure of educational research, and to bring about a widespread and continuing effort in research, development, innovation, and evaluation in education, there is great need for a national commission to provide leadership. We have considered a number of proposals for the initiation and operation of such a commission. We have concluded that it must meet these criteria: (1) independence of both the educational bureaucracy and of government;

(2) prestige and influence, which calls for members of competence and distinction; and (3) effectiveness, which means that it must command talent of a high order and be capable of acquiring the funds necessary to its work.

> **We propose the creation of a Commission on Research, Innovation, and Evaluation in Education,* established under charter by Congress as an independent, nongovernmental agency, empowered to receive both public and private funds. The membership of the Commission should be broadly representative of the major segments of our society and should comprise persons of unquestioned stature as educational statesmen. While each of the Commission's three basic functions should be performed independently of the others, achievement of the common purpose—improvement in education—calls for these efforts to be coordinated, especially in matters of priority.**

In its *research* function the Commission should stimulate and encourage both basic and applied research in all branches of education. It should project studies to determine areas of needed research and should coordinate research activities in the interest of economy and adequate coverage. It should authorize and fund studies of the purposes and goals of education and should establish projects for the improvement of the curriculum and for other purposes relating to the strengthening of school instruction.

In its *innovation* function the Commission should stimulate developmental work employing the findings of research and see that the product of that work is disseminated in usable form to the schools. It should encourage the schools in innovative and experimental activities and establish lines of communication between research, experimental, and developmental agencies, publishers, manufacturers, state school offices, and the schools to assure that teachers and administrators will have access to new information. It should seek the widest use possible of innovations where their effectiveness has been demonstrated.

In its *evaluation* function the Commission should authorize and fund appropriate evaluations of the product of the schools and of the effectiveness of innovation in improving that product. It should be concerned not only with the basic learning skills and the acquisition of knowledge but also with the effectiveness of the schools in achieving the entire spectrum of educational purposes and goals. It should be concerned also with the financial efficiency of the schools and school systems and the effectiveness of school and instructional organization.

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*See Memorandum by ELVIS J. STAHR, page 73.

To ensure its national status and recognition, the Commission should be established by an act of Congress and should be provided a congressional charter as evidence of national support of its purpose. The incorporators of the Commission should be named in the congressional act and should be among the most distinguished civic leaders of the nation, including such persons as past Presidents of the United States. The incorporators should select and appoint the initial members of the Commission, who thereafter should select their successors.

The Commission should be a private, nonprofit, nongovernmental agency, legally empowered to receive and expend both government and private funds. Federal funds should be channeled to it by grants from the United States Office of Education, the National Science Foundation, and other governmental agencies charged with the improvement of education.

The Commission should be broadly representative of society and its membership should be persons of unquestioned stature as educational statesmen who can command the esteem of all who are interested in the state of the schools. The establishment of the membership of the Commission should be free from governmental action or political considerations.

There can be little question of the value of the private nongovernmental agency for coping with certain large national problems which should be taken out of the political sector.[1] It is an administrative device which is rapidly proving itself on many fronts, making possible the use of both public and private funds in the national interest while avoiding political controls and governmental bureaucratic involvements.

We believe that this type of organization should be especially effective in the area of education.

1/There is ample precedent for the establishment of such a private nongovernmental agency by governmental action with the power to receive both public and private monies. As recently as November 1967, the Congress enacted into law the "Public Broadcasting Act of 1967" which authorized the establishment of "a nonprofit corporation, to be known as the 'Corporation for Public Broadcasting,' which will not be an agency or establishment of the United States Government." (Title II, Pt. IV). The Act authorized the appropriation of $9,000,000 for the expenses of the Corporation for the remainder of the fiscal year ending June 30, 1968.

MEMORANDA
OF COMMENT, RESERVATION, OR DISSENT

Page 14—By MARVIN BOWER:

I question whether "natural response to society's expectation" is the full reason for the resistance to change found in the school establishment. I believe there is also a strong element of self-interest and vested interest which can be rested safely on tenure. Except for the judiciary, most tenure in our society leads to harmful results for society.

Page 17—By S. CLARK BEISE:

It seems to me that the matter of dissemination of recommended changes has not been dealt with adequately. One of the major problems inhibiting change in our present educational programs and processes is the lack of communication between educators, teachers, administrators, school boards and the public. This statement develops a program for research and innovation including means of implementing improvements in our educational processes by trial in pilot operations, but has not carried its recommendation through to the point of being able to demonstrate their value to those who must be convinced that changes should be made. In order to disseminate information on recommended changes effectively, there should be established a system of demonstration schools, reasonably available geographically, to show what can be done in general practice to implement and integrate the recommended improvements, within practical costs, into a rounded program.

Pages 20 and 70—By ELVIS J. STAHR, with which CHARLES KELLER, JR. has asked to be associated:

While concurring wholeheartedly with the over-all objectives of the Committee report, I would note some reservations and alternate recommendations regarding processes:

1. Further consideration should precede the establishment of the National Commission. The functions specified for the Commission are, at the same time, too general and too specific. They are too general in the sense that they encompass the full range of functions assigned presently to the Bureau of Research in the U. S. Office of Education without specifying how they could be better accomplished using the vehicle proposed. They are too specific in mentioning certain tactics, e.g., demonstration schools, which have been tried often in the past (as recently as ESEA-1965) and found wanting.

Alternatively, I would propose the establishment of a National Study Commission on Research, Evaluation, and Innovation in Education. The function of the Study Commission would be to:

a) Assess and evaluate in detail the current efforts to effect change in education, e.g., the nine R and D centers, the twenty regional educational laboratories, the local experimental and demonstration schools set up under ESEA Title III.

b) Recommend one or several agencies or mechanisms to achieve the ends proposed for the National Commission based upon an empirical assessment of present programs.

2. The treatment provided the topic "Stimulating Research and Innovation" overemphasizes dissemination and underplays development. In education, as in most social process fields, the dissemination process depends less upon communication and demonstration devices than upon engineering capacity. The primary problem facing education today is a paucity of solutions to operating problems ready for dissemination. The ineptness of the Title III centers and the Regional Educational Laboratories is traceable, in my opinion, to their inability to mount engineering programs which will provide inventions for dissemination.

3. The report is overly-optimistic about the stage of development of the field of evaluation in education. Useful application of cost effectiveness techniques in local school units requires a companion effort to develop techniques and instruments capable of providing valid and reliable data bridging input, process, and product components of the

educational enterprise. No evaluation agency, e.g., UCLA R and D Center, University of Illinois C.I.R.C.E., is now capable of lending operational assistance to local districts in setting up such a quality control system. I would recommend the establishment of a National Consortium of Evaluation Agencies to deal explicitly with this problem (fifteen were represented at a recent meeting designed to explore this possibility). This consortium should direct its attention toward mobilizing the best minds available currently, to mount a national effort to operationalize evaluation techniques necessary to the establishment of local quality control systems for educational units.

Page 29—By FRED J. BORCH:

With respect to the need for more and better research, the report seems to minimize the very substantial monetary effort the federal government has been making, particularly in the last four years, to support the very kinds of projects being recommended. As a result, there are many who think that the quality of basic research is more important than a major increase in research funds.

Page 43—By WILLIAM BENTON:

This failure to integrate technical equipment into basic planning is also in some measure the fault of school administrators. As Wilbur Schramm, Philip H. Coombs, *et al.* note in *The New Media: Memo to Educational Planners,* published in 1967 by UNESCO's International Institute for Educational Planning: "Obviously, integration will be easier if the media are accepted by the chief groups and individuals in the system able to do something about them. This means strong support from top authority, without which any major educational innovation has a difficult time."

Page 58—By FRED J. BORCH:

I am concerned that the statement regarding cost-benefits analysis may be far too optimistic. Cost-benefits analysis implies the definition of a mission, and appropriate and reliable means of measuring the degree to which alternatives achieve the goals of the mission relative to their cost. Therefore, it would appear sensible to recognize that the application of this technique will have to be limited sharply to a few specifics rather than to imply the technique will in the near future permit more global measures of cost effectiveness for a school system.

APPENDIX

Studies prepared for the CED Subcommittee on Efficiency and Innovation in Education

The papers prepared to aid the deliberations of the Subcommittee on Efficiency and Innovation in Education cover a broad range of topics, including intergovernmental cooperation in public schooling, the financing of education, the essential role of the teacher, cost-benefit and cost-effectiveness analyses of instruction, research in education, and utilization of the new technology. Plans are being made to publish twelve of these studies as a CED Supplementary Paper upon completion of the process of approval.

It is expected that the twelve papers will be published in two parts. Titles and authors' names are therefore listed on this basis.

I. "Teaching and Teachers–Today and Tomorrow," *Roald F. Campbell, University of Chicago*

"Problems and Possibilities in Educational Evaluation," *Ralph W. Tyler, Director Emeritus, Center for Advanced Study in the Behavioral Sciences*

"Thought, Invention and Research in the Advancement of Education," *John I. Goodlad, University of California, Los Angeles*

"Intrastate and Interstate Cooperation to Improve Efficiency in Education," *J. Alan Thomas, University of Chicago*

"Financing More Effective Education," *H. Thomas James, Stanford University*

"The Application of Economic Reasoning to Resource Allocations in Education," *Charles S. Benson, University of California*

II. "The Teacher and the Machine," *Philip W. Jackson, University of Chicago*

"Audiovisual Instruction: The State of the Art," *William H. Allen, University of Southern California*

"Educational Technology–The Design and Programming of Instruction," *Robert Glaser, University of Pittsburgh*

"Some Basic Questions About Instructional Television," *Wilbur Schramm, Stanford University*

"Computer-Assisted Instruction," *Lawrence Stolurow, Harvard University*

"Costs of Installing and Operating Instructional Television and Computer-Assisted Instruction in Public Schools," *Clyde N. Carter and Maurice J. Walker, Booz • Allen & Hamilton Inc.*

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